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gcggcgccag catggcggtc gtctcgctgt ccagctcgg gatcatcgag cgcctgcccg 68700
atcctccgct tccagggttc gattcggcca aggtgacgag ctccgatatc           68750
```

```
<210> 2
<211> 1421
<212> PRT
<213> Sorangium cellulosum

<400> 2
Val Ala Asp Arg Pro Ile Glu Arg Ala Ala Glu Asp Pro Ile Ala Ile
1               5                   10                  15

Val Gly Ala Ser Cys Arg Leu Pro Gly Gly Val Ile Asp Leu Ser Gly
                20                  25                  30

Phe Trp Thr Leu Leu Glu Gly Ser Arg Asp Thr Val Gly Arg Val Pro
        35                  40                  45
```

```
Ala Glu Arg Trp Asp Ala Ala Ala Trp Phe Asp Pro Asp Pro Asp Ala
    50              55              60
```

```
Pro Gly Lys Thr Pro Val Thr Arg Ala Ser Phe Leu Ser Asp Val Ala
65              70              75              80
```

```
Cys Phe Asp Ala Ser Phe Phe Gly Ile Ser Pro Arg Glu Ala Leu Arg
                85              90              95
```

```
Met Asp Pro Ala His Arg Leu Leu Leu Glu Val Cys Trp Glu Ala Leu
            100             105             110
```

```
Glu Asn Ala Ala Ile Ala Pro Ser Ala Leu Val Gly Thr Glu Thr Gly
        115             120             125
```

```
Val Phe Ile Gly Ile Gly Pro Ser Glu Tyr Glu Ala Ala Leu Pro Gln
    130             135             140
```

```
Ala Thr Ala Ser Ala Glu Ile Asp Ala His Gly Gly Leu Gly Thr Met
145             150             155             160
```

```
Pro Ser Val Gly Ala Gly Arg Ile Ser Tyr Ala Leu Gly Leu Arg Gly
                165             170             175
```

```
Pro Cys Val Ala Val Asp Thr Ala Tyr Ser Ser Ser Leu Val Ala Val
            180             185             190
```

```
His Leu Ala Cys Gln Ser Leu Arg Ser Gly Glu Cys Ser Thr Ala Leu
        195             200             205
```

```
Ala Gly Gly Val Ser Leu Met Leu Ser Pro Ser Thr Leu Val Trp Leu
    210             215             220
```

```
Ser Lys Thr Arg Ala Leu Ala Arg Asp Gly Arg Cys Lys Ala Phe Ser
225             230             235             240
```

```
Ala Glu Ala Asp Gly Phe Gly Arg Gly Glu Gly Cys Ala Val Val Val
            245             250             255
```

```
Leu Lys Arg Leu Ser Gly Ala Arg Ala Asp Gly Asp Arg Ile Leu Ala
            260             265             270
```

```
Val Ile Arg Gly Ser Ala Ile Asn His Asp Gly Ala Ser Ser Gly Leu
    275             280             285
```

```
Thr Val Pro Asn Gly Ser Ser Gln Glu Ile Val Leu Lys Arg Ala Leu
    290             295             300
```

```
Ala Asp Ala Gly Cys Ala Ala Ser Ser Val Gly Tyr Val Glu Ala His
305             310             315             320
```

```
Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu Ile Gln Ala Leu Asn
            325             330             335
```

```
Ala Val Tyr Gly Leu Gly Arg Asp Val Ala Thr Pro Leu Leu Ile Gly
        340             345             350
```

```
Ser Val Lys Thr Asn Leu Gly His Pro Glu Tyr Ala Ser Gly Ile Thr
    355             360             365
```

```
Gly Leu Leu Lys Val Val Leu Ser Leu Gln His Gly Gln Ile Pro Ala
    370             375             380
```

```
His Leu His Ala Gln Ala Leu Asn Pro Arg Ile Ser Trp Gly Asp Leu
385             390             395             400
```

```
Arg Leu Thr Val Thr Arg Ala Arg Thr Pro Trp Pro Asp Trp Asn Thr
              405             410         415

Pro Arg Arg Ala Gly Val Ser Ser Phe Gly Met Ser Gly Thr Asn Ala
              420             425         430

His Val Val Leu Glu Glu Ala Pro Ala Ala Thr Cys Thr Pro Pro Ala
              435             440         445

Pro Glu Arg Pro Ala Glu Leu Leu Val Leu Ser Ala Arg Thr Ala Ser
    450             455         460

Ala Leu Asp Ala Gln Ala Ala Arg Leu Arg Asp His Leu Glu Thr Tyr
465             470         475             480

Pro Ser Gln Cys Leu Gly Asp Val Ala Phe Ser Leu Ala Thr Thr Arg
              485         490             495

Ser Ala Met Glu His Arg Leu Ala Val Ala Ala Thr Ser Arg Glu Gly
              500             505         510

Leu Arg Ala Ala Leu Asp Ala Ala Ala Gln Gly Gln Thr Ser Pro Gly
        515             520         525

Ala Val Arg Ser Ile Ala Asp Ser Ser Arg Gly Lys Leu Ala Phe Leu
    530             535         540

Phe Thr Gly Gln Gly Ala Gln Thr Leu Gly Met Gly Arg Gly Leu Tyr
545             550         555             560

Asp Val Trp Ser Ala Phe Arg Glu Ala Phe Asp Leu Cys Val Arg Leu
              565         570             575

Phe Asn Gln Glu Leu Asp Arg Pro Leu Arg Glu Val Met Trp Ala Glu
              580         585             590

Pro Ala Ser Val Asp Ala Ala Leu Leu Asp Gln Thr Ala Phe Thr Gln
              595             600         605

Pro Ala Leu Phe Thr Phe Glu Tyr Ala Leu Ala Ala Leu Trp Arg Ser
    610             615         620

Trp Gly Val Glu Pro Glu Leu Val Ala Gly His Ser Ile Gly Glu Leu
625             630         635             640

Val Ala Ala Cys Val Ala Gly Val Phe Ser Leu Glu Asp Ala Val Phe
              645             650         655

Leu Val Ala Ala Arg Gly Arg Leu Met Gln Ala Leu Pro Ala Gly Gly
              660         665         670

Ala Met Val Ser Ile Glu Ala Pro Glu Ala Asp Val Ala Ala Ala Val
          675             680         685

Ala Pro His Ala Ala Ser Val Ser Ile Ala Ala Val Asn Ala Pro Asp
    690             695         700

Gln Val Val Ile Ala Gly Ala Gly Gln Pro Val His Ala Ile Ala Ala
705             710         715             720

Ala Met Ala Ala Arg Gly Ala Arg Thr Lys Ala Leu His Val Ser His
          725         730             735

Ala Phe His Ser Pro Leu Met Ala Pro Met Leu Glu Ala Phe Gly Arg
          740             745         750
```

Val Ala Glu Ser Val Ser Tyr Arg Arg Pro Ser Ile Val Leu Val Ser
     755   760   765

Asn Leu Ser Gly Lys Ala Cys Thr Asp Glu Val Ser Ser Pro Gly Tyr
     770   775   780

Trp Val Arg His Ala Arg Glu Val Val Arg Phe Ala Asp Gly Val Lys
785   790   795   800

Ala Leu His Ala Ala Gly Ala Gly Thr Phe Val Glu Val Gly Pro Lys
         805   810   815

Ser Thr Leu Leu Gly Leu Val Pro Ala Cys Met Pro Asp Ala Arg Pro
        820   825   830

Ala Leu Leu Ala Ser Ser Arg Ala Gly Arg Asp Glu Pro Ala Thr Val
        835   840   845

Leu Glu Ala Leu Gly Gly Leu Trp Ala Val Gly Gly Leu Val Ser Trp
     850   855   860

Ala Gly Leu Phe Pro Ser Gly Gly Arg Arg Val Pro Leu Pro Thr Tyr
865   870   875   880

Pro Trp Gln Arg Glu Arg Tyr Trp Ile Asp Thr Lys Ala Asp Asp Ala
        885   890   895

Ala Arg Gly Asp Arg Arg Ala Pro Gly Ala Gly His Asp Glu Val Glu
        900   905   910

Glu Gly Gly Ala Val Arg Gly Gly Asp Arg Arg Ser Ala Arg Leu Asp
        915   920   925

His Pro Pro Glu Ser Gly Arg Arg Glu Lys Val Glu Ala Ala Gly
     930   935   940

Asp Arg Pro Phe Arg Leu Glu Ile Asp Glu Pro Gly Val Leu Asp His
945   950   955   960

Leu Val Leu Arg Val Thr Glu Arg Arg Ala Pro Gly Leu Gly Glu Val
        965   970   975

Glu Ile Ala Val Asp Ala Ala Gly Leu Ser Phe Asn Asp Val Gln Leu
        980   985   990

Ala Leu Gly Met Val Pro Asp Asp Leu Pro Gly Lys Pro Asn Pro Pro
     995   1000   1005

Leu Leu Leu Gly Gly Glu Cys Ala Gly Arg Ile Val Ala Val Gly Glu
    1010   1015   1020

Gly Val Asn Gly Leu Val Val Gly Gln Pro Val Ile Ala Leu Ser Ala
1025   1030   1035   1040

Gly Ala Phe Ala Thr His Val Thr Thr Ser Ala Ala Leu Val Leu Pro
        1045   1050   1055

Arg Pro Gln Ala Leu Ser Ala Ile Glu Ala Ala Ala Met Pro Val Ala
        1060   1065   1070

Tyr Leu Thr Ala Trp Tyr Ala Leu Asp Arg Ile Ala Arg Leu Gln Pro
       1075   1080   1085

Gly Glu Arg Val Leu Ile His Ala Ala Thr Gly Gly Val Gly Leu Ala
    1090   1095   1100

```
Ala Val Gln Trp Ala Gln His Val Gly Ala Glu Val His Ala Thr Ala
1105                1110                1115                1120

Gly Thr Pro Glu Lys Arg Ala Tyr Leu Glu Ser Leu Gly Val Arg Tyr
          1125                1130                1135

Val Ser Asp Ser Arg Ser Asp Arg Phe Val Ala Asp Val Arg Ala Trp
        1140                1145                1150

Thr Gly Gly Glu Gly Val Asp Val Val Leu Asn Ser Leu Ser Gly Glu
        1155                1160                1165

Leu Ile Asp Lys Ser Phe Asn Leu Leu Arg Ser His Gly Arg Phe Val
        1170                1175                1180

Glu Leu Gly Lys Arg Asp Cys Tyr Ala Asp Asn Gln Leu Gly Leu Arg
1185                1190                1195                1200

Pro Phe Leu Arg Asn Leu Ser Phe Ser Leu Val Asp Leu Arg Gly Met
          1205                1210                1215

Met Leu Glu Arg Pro Ala Arg Val Arg Ala Leu Leu Glu Glu Leu Leu
          1220                1225                1230

Gly Leu Ile Ala Ala Gly Val Phe Thr Pro Pro Pro Ile Ala Thr Leu
        1235                1240                1245

Pro Ile Ala Arg Val Ala Asp Ala Phe Arg Ser Met Ala Gln Ala Gln
    1250                1255                1260

His Leu Gly Lys Leu Val Leu Thr Leu Gly Asp Pro Glu Val Gln Ile
1265                1270                1275                1280

Arg Ile Pro Thr His Ala Gly Ala Gly Pro Ser Thr Gly Asp Arg Asp
                1285                1290                1295

Leu Leu Asp Arg Leu Ala Ser Ala Ala Pro Ala Ala Arg Ala Ala Ala
        1300                1305                1310

Leu Glu Ala Phe Leu Arg Thr Gln Val Ser Gln Val Leu Arg Thr Pro
    1315                1320                1325

Glu Ile Lys Val Gly Ala Glu Ala Leu Phe Thr Arg Leu Gly Met Asp
    1330                1335                1340

Ser Leu Met Ala Val Glu Leu Arg Asn Arg Ile Glu Ala Ser Leu Lys
1345                1350                1355                1360

Leu Lys Leu Ser Thr Thr Phe Leu Ser Thr Ser Pro Asn Ile Ala Leu
          1365                1370                1375

Leu Ala Gln Asn Leu Leu Asp Ala Leu Ala Thr Ala Leu Ser Leu Glu
        1380                1385                1390

Arg Val Ala Ala Glu Asn Leu Arg Ala Gly Val Gln Asn Asp Phe Val
    1395                1400                1405

Ser Ser Gly Ala Asp Gln Asp Trp Glu Ile Ile Ala Leu
    1410                1415                1420
```

```
<210> 3
<211> 1410
<212> PRT
<213> Sorangium cellulosum
```

<400> 3
```
Met Thr Ile Asn Gln Leu Leu Asn Glu Leu Glu His Gln Gly Ile Lys
 1               5                  10                  15

Leu Ala Ala Asp Gly Glu Arg Leu Gln Ile Gln Ala Pro Lys Asn Ala
            20                  25                  30

Leu Asn Pro Asn Leu Leu Ala Arg Ile Ser Glu His Lys Ser Thr Ile
        35                  40                  45

Leu Thr Met Leu Arg Gln Arg Leu Pro Ala Glu Ser Ile Val Pro Ala
    50                  55                  60

Pro Ala Glu Arg His Ala Pro Phe Pro Leu Thr Asp Ile Gln Glu Ser
65                  70                  75                  80

Tyr Trp Leu Gly Arg Thr Gly Ala Phe Thr Val Pro Ser Gly Ile His
                85                  90                  95

Ala Tyr Arg Glu Tyr Asp Cys Thr Asp Leu Asp Val Pro Arg Leu Ser
            100                 105                 110

Arg Ala Phe Arg Lys Val Val Ala Arg His Asp Met Leu Arg Ala His
        115                 120                 125

Thr Leu Pro Asp Met Met Gln Val Ile Glu Pro Lys Val Asp Ala Asp
    130                 135                 140

Ile Glu Ile Ile Asp Leu Arg Gly Leu Asp Arg Ser Thr Arg Glu Ala
145                 150                 155                 160

Arg Leu Val Ser Leu Arg Asp Ala Met Ser His Arg Ile Tyr Asp Thr
            165                 170                 175

Glu Arg Pro Pro Leu Tyr His Val Val Ala Val Arg Leu Asp Glu Arg
            180                 185                 190

Gln Thr Arg Leu Val Leu Ser Ile Asp Leu Ile Asn Val Asp Leu Gly
        195                 200                 205

Ser Leu Ser Ile Ile Phe Lys Asp Trp Leu Ser Phe Tyr Glu Asp Pro
    210                 215                 220

Glu Thr Ser Leu Pro Val Leu Glu Leu Ser Tyr Arg Asp Tyr Val Leu
225                 230                 235                 240

Ala Leu Glu Ser Arg Lys Lys Ser Glu Ala His Gln Arg Ser Met Asp
            245                 250                 255

Tyr Trp Lys Arg Arg Ile Ala Glu Leu Pro Pro Pro Thr Leu Pro
        260                 265                 270

Met Lys Ala Asp Pro Ser Thr Leu Lys Glu Ile Arg Phe Arg His Thr
    275                 280                 285

Glu Gln Trp Leu Pro Ser Asp Ser Trp Gly Arg Leu Lys Arg Arg Val
    290                 295                 300

Gly Glu Arg Gly Leu Thr Pro Thr Gly Val Ile Leu Ala Ala Phe Ser
305                 310                 315                 320

Glu Val Ile Gly Arg Trp Ser Ala Ser Pro Arg Phe Thr Leu Asn Ile
            325                 330                 335

Thr Leu Phe Asn Arg Leu Pro Val His Pro Arg Val Asn Asp Ile Thr
```

```
                 340                    345                    350
Gly Asp Phe Thr Ser Met Val Leu Leu Asp Ile Asp Thr Thr Arg Asp
         355                    360                    365
Lys Ser Phe Glu Gln Arg Ala Lys Arg Ile Gln Glu Gln Leu Trp Glu
         370                    375                    380
Ala Met Asp His Cys Asp Val Ser Gly Ile Glu Val Gln Arg Glu Ala
385                    390                    395                    400
Ala Arg Val Leu Gly Ile Gln Arg Gly Ala Leu Phe Pro Val Val Leu
                 405                    410                    415
Thr Ser Ala Leu Asn Gln Gln Val Val Gly Val Thr Ser Leu Gln Arg
                 420                    425                    430
Leu Gly Thr Pro Val Tyr Thr Ser Thr Gln Thr Pro Gln Leu Leu Leu
                 435                    440                    445
Asp His Gln Leu Tyr Glu His Asp Gly Asp Leu Val Leu Ala Trp Asp
         450                    455                    460
Ile Val Asp Gly Val Phe Pro Pro Asp Leu Leu Asp Asp Met Leu Glu
465                    470                    475                    480
Ala Tyr Val Val Phe Leu Arg Arg Leu Thr Glu Glu Pro Trp Gly Glu
                 485                    490                    495
Gln Val Arg Cys Ser Leu Pro Pro Ala Gln Leu Glu Ala Arg Ala Ser
                 500                    505                    510
Ala Asn Ala Thr Asn Ala Leu Leu Ser Glu His Thr Leu His Gly Leu
                 515                    520                    525
Phe Ala Ala Arg Val Glu Gln Leu Pro Met Gln Leu Ala Val Val Ser
         530                    535                    540
Ala Arg Lys Thr Leu Thr Tyr Glu Glu Leu Ser Arg Arg Ser Arg Arg
545                    550                    555                    560
Leu Gly Ala Arg Leu Arg Glu Gln Gly Ala Arg Pro Asn Thr Leu Val
                 565                    570                    575
Ala Val Val Met Glu Lys Gly Trp Glu Gln Val Val Ala Val Leu Ala
                 580                    585                    590
Val Leu Glu Ser Gly Ala Ala Tyr Val Pro Ile Asp Ala Asp Leu Pro
                 595                    600                    605
Ala Glu Arg Ile His Tyr Leu Leu Asp His Gly Glu Val Lys Leu Val
         610                    615                    620
Leu Thr Gln Pro Trp Leu Asp Gly Lys Leu Ser Trp Pro Pro Gly Ile
625                    630                    635                    640
Gln Arg Leu Leu Val Ser Glu Ala Gly Val Glu Gly Asp Gly Asp Gln
                 645                    650                    655
Pro Pro Met Met Pro Ile Gln Thr Pro Ser Asp Leu Ala Tyr Val Ile
                 660                    665                    670
Tyr Thr Ser Gly Ser Thr Gly Leu Pro Lys Gly Val Met Ile Asp His
         675                    680                    685
Arg Gly Ala Val Asn Thr Ile Leu Asp Ile Asn Glu Arg Phe Glu Ile
```

```
              690                    695                    700
Gly Pro Gly Asp Arg Val Leu Ala Leu Ser Ser Leu Ser Phe Asp Leu
705                 710                 715                 720
Ser Val Tyr Asp Val Phe Gly Ile Leu Ala Ala Gly Gly Thr Ile Val
                725                 730                 735
Val Pro Asp Ala Ser Lys Leu Arg Asp Pro Ala His Trp Ala Glu Leu
            740                 745                 750
Ile Glu Arg Glu Lys Val Thr Val Trp Asn Ser Val Pro Ala Leu Met
            755                 760                 765
Arg Met Leu Val Glu His Phe Glu Gly Arg Pro Asp Ser Leu Ala Arg
            770                 775                 780
Ser Leu Arg Leu Ser Leu Leu Ser Gly Asp Trp Ile Pro Val Gly Leu
785                 790                 795                 800
Pro Gly Glu Leu Gln Ala Ile Arg Pro Gly Val Ser Val Ile Ser Leu
                805                 810                 815
Gly Gly Ala Thr Glu Ala Ser Ile Trp Ser Ile Gly Tyr Pro Val Arg
                820                 825                 830
Asn Val Asp Leu Ser Trp Ala Ser Ile Pro Tyr Gly Arg Pro Leu Arg
            835                 840                 845
Asn Gln Thr Phe His Val Leu Asp Glu Ala Leu Glu Pro Arg Pro Val
            850                 855                 860
Trp Val Pro Gly Gln Leu Tyr Ile Gly Gly Val Gly Leu Ala Leu Gly
865                 870                 875                 880
Tyr Trp Arg Asp Glu Glu Lys Thr Arg Lys Ser Phe Leu Val His Pro
                885                 890                 895
Glu Thr Gly Glu Arg Leu Tyr Lys Thr Gly Asp Leu Gly Arg Tyr Leu
                900                 905                 910
Pro Asp Gly Asn Ile Glu Phe Met Gly Arg Glu Asp Asn Gln Ile Lys
            915                 920                 925
Leu Arg Gly Tyr Arg Val Glu Leu Gly Glu Ile Glu Glu Thr Leu Lys
            930                 935                 940
Ser His Pro Asn Val Arg Asp Ala Val Ile Val Pro Val Gly Asn Asp
945                 950                 955                 960
Ala Ala Asn Lys Leu Leu Leu Ala Tyr Val Val Pro Glu Gly Thr Arg
                965                 970                 975
Arg Arg Ala Ala Glu Gln Asp Ala Ser Leu Lys Thr Glu Arg Ile Asp
            980                 985                 990
Ala Arg Ala His Ala Ala Glu Ala Asp Gly Leu Ser Asp Gly Glu Arg
            995                 1000                1005
Val Gln Phe Lys Leu Ala Arg His Gly Leu Arg Arg Asp Leu Asp Gly
    1010                1015                1020
Lys Pro Val Val Asp Leu Thr Gly Gln Asp Pro Arg Glu Ala Gly Leu
1025                1030                1035                1040
Asp Val Tyr Ala Arg Arg Arg Ser Val Arg Thr Phe Leu Glu Ala Pro
```

```
                 1045                    1050                    1055
        Ile Pro Phe Val Glu Phe Gly Arg Phe Leu Ser Cys Leu Ser Ser Val
                    1060                    1065                    1070

        Glu Pro Asp Gly Ala Thr Leu Pro Lys Phe Arg Tyr Pro Ser Ala Gly
                    1075                    1080                    1085

        Ser Thr Tyr Pro Val Gln Thr Tyr Ala Tyr Val Lys Ser Gly Arg Ile
                 1090                    1095                    1100

        Glu Gly Val Asp Glu Gly Phe Tyr Tyr Tyr His Pro Phe Glu His Arg
        1105                    1110                    1115                    1120

        Leu Leu Lys Leu Ser Asp His Gly Ile Glu Arg Gly Ala His Val Arg
                    1125                    1130                    1135

        Gln Asn Phe Asp Val Phe Asp Glu Ala Ala Phe Asn Leu Leu Phe Val
                    1140                    1145                    1150

        Gly Arg Ile Asp Ala Ile Glu Ser Leu Tyr Gly Ser Ser Ser Arg Glu
                 1155                    1160                    1165

        Phe Cys Leu Leu Glu Ala Gly Tyr Met Ala Gln Leu Leu Met Glu Gln
                 1170                    1175                    1180

        Ala Pro Ser Cys Asn Ile Gly Val Cys Pro Val Gly Gln Phe Asn Phe
        1185                    1190                    1195                    1200

        Glu Gln Val Arg Pro Val Leu Asp Leu Arg His Ser Asp Val Tyr Val
                    1205                    1210                    1215

        His Gly Met Leu Gly Gly Arg Val Asp Pro Arg Gln Phe Gln Val Cys
                    1220                    1225                    1230

        Thr Leu Gly Gln Asp Ser Ser Pro Arg Arg Ala Thr Thr Arg Gly Ala
                    1235                    1240                    1245

        Pro Pro Gly Arg Glu Gln His Phe Ala Asp Met Leu Arg Asp Phe Leu
            1250                    1255                    1260

        Arg Thr Lys Leu Pro Glu Tyr Met Val Pro Thr Val Phe Val Glu Leu
        1265                    1270                    1275                    1280

        Asp Ala Leu Pro Leu Thr Ser Asn Gly Lys Val Asp Arg Lys Ala Leu
                    1285                    1290                    1295

        Arg Glu Arg Lys Asp Thr Ser Ser Pro Arg His Ser Gly His Thr Ala
                 1300                    1305                    1310

        Pro Arg Asp Ala Leu Glu Glu Ile Leu Val Ala Val Val Arg Glu Val
                 1315                    1320                    1325

        Leu Gly Leu Glu Val Val Gly Leu Gln Gln Ser Phe Val Asp Leu Gly
            1330                    1335                    1340

        Ala Thr Ser Ile His Ile Val Arg Met Arg Ser Leu Leu Gln Lys Arg
        1345                    1350                    1355                    1360

        Leu Asp Arg Glu Ile Ala Ile Thr Glu Leu Phe Gln Tyr Pro Asn Leu
                    1365                    1370                    1375

        Gly Ser Leu Ala Ser Gly Leu Arg Arg Asp Ser Arg Asp Leu Asp Gln
                 1380                    1385                    1390

        Arg Pro Asn Met Gln Asp Arg Val Glu Val Arg Arg Lys Gly Arg Arg
```

1395   1400   1405

Arg Ser
   1410

<210> 4
<211> 1832
<212> PRT
<213> Sorangium cellulosum

<400> 4
Met Glu Glu Gln Glu Ser Ser Ala Ile Ala Val Ile Gly Met Ser Gly
  1   5   10   15

Arg Phe Pro Gly Ala Arg Asp Leu Asp Glu Phe Trp Arg Asn Leu Arg
          20   25   30

Asp Gly Thr Glu Ala Val Gln Arg Phe Ser Glu Gln Glu Leu Ala Ala
      35   40   45

Ser Gly Val Asp Pro Ala Leu Val Leu Asp Pro Ser Tyr Val Arg Ala
    50   55   60

Gly Ser Val Leu Glu Asp Val Asp Arg Phe Asp Ala Ala Phe Phe Gly
65   70   75   80

Ile Ser Pro Arg Glu Ala Glu Leu Met Asp Pro Gln His Arg Ile Phe
          85   90   95

Met Glu Cys Ala Trp Glu Ala Leu Glu Asn Ala Gly Tyr Asp Pro Thr
          100   105   110

Ala Tyr Glu Gly Ser Ile Gly Val Tyr Ala Gly Ala Asn Met Ser Ser
          115   120   125

Tyr Leu Thr Ser Asn Leu His Glu His Pro Ala Met Met Arg Trp Pro
    130   135   140

Gly Trp Phe Gln Thr Leu Ile Gly Asn Asp Lys Asp Tyr Leu Ala Thr
145   150   155   160

His Val Ser Tyr Arg Leu Asn Leu Arg Gly Pro Ser Ile Ser Val Gln
          165   170   175

Thr Ala Cys Ser Thr Ser Leu Val Ala Val His Leu Ala Cys Met Ser
          180   185   190

Leu Leu Asp Arg Glu Cys Asp Met Ala Leu Ala Gly Gly Ile Thr Val
          195   200   205

Arg Ile Pro His Arg Ala Gly Tyr Val Tyr Ala Glu Gly Gly Ile Phe
    210   215   220

Ser Pro Asp Gly His Cys Arg Ala Phe Asp Ala Lys Ala Asn Gly Thr
225   230   235   240

Ile Met Gly Asn Gly Cys Gly Val Val Leu Leu Lys Pro Leu Asp Arg
          245   250   255

Ala Leu Ser Asp Gly Asp Pro Val Arg Ala Val Ile Leu Gly Ser Ala
          260   265   270

Thr Asn Asn Asp Gly Ala Arg Lys Ile Gly Phe Thr Ala Pro Ser Glu
          275   280   285

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```
Val Gly Gln Ala Gln Ala Ile Met Glu Ala Leu Ala Leu Ala Gly Val
    290                 295                 300

Glu Ala Arg Ser Ile Gln Tyr Ile Glu Thr His Gly Thr Gly Thr Leu
305                 310                 315                 320

Leu Gly Asp Ala Ile Glu Thr Ala Ala Leu Arg Arg Val Phe Gly Arg
                325                 330                 335

Asp Ala Ser Ala Arg Arg Ser Cys Ala Ile Gly Ser Val Lys Thr Gly
                340                 345                 350

Ile Gly His Leu Glu Ser Ala Ala Gly Ile Ala Gly Leu Ile Lys Thr
            355                 360                 365

Val Leu Ala Leu Glu His Arg Gln Leu Pro Pro Ser Leu Asn Phe Glu
    370                 375                 380

Ser Pro Asn Pro Ser Ile Asp Phe Ala Ser Ser Pro Phe Tyr Val Asn
385                 390                 395                 400

Thr Ser Leu Lys Asp Trp Asn Thr Gly Ser Thr Pro Arg Arg Ala Gly
                405                 410                 415

Val Ser Ser Phe Gly Ile Gly Gly Thr Asn Ala His Val Val Leu Glu
                420                 425                 430

Glu Ala Pro Ala Ala Lys Leu Pro Ala Ala Ala Pro Ala Arg Ser Ala
            435                 440                 445

Glu Leu Phe Val Val Ser Ala Lys Ser Ala Ala Ala Leu Asp Ala Ala
    450                 455                 460

Ala Ala Arg Leu Arg Asp His Leu Gln Ala His Gln Gly Ile Ser Leu
465                 470                 475                 480

Gly Asp Val Ala Phe Ser Leu Ala Thr Thr Arg Ser Pro Met Glu His
                485                 490                 495

Arg Leu Ala Met Ala Ala Pro Ser Arg Glu Ala Leu Arg Glu Gly Leu
                500                 505                 510

Asp Ala Ala Ala Arg Gly Gln Thr Pro Pro Gly Ala Val Arg Gly Arg
            515                 520                 525

Cys Ser Pro Gly Asn Val Pro Lys Val Val Phe Val Phe Pro Gly Gln ,
    530                 535                 540

Gly Ser Gln Trp Val Gly Met Gly Arg Gln Leu Leu Ala Glu Glu Pro
545                 550                 555                 560

Val Phe His Ala Ala Leu Ser Ala Cys Asp Arg Ala Ile Gln Ala Glu
                565                 570                 575

Ala Gly Trp Ser Leu Leu Ala Glu Leu Ala Ala Asp Glu Gly Ser Ser
                580                 585                 590

Gln Leu Glu Arg Ile Asp Val Val Gln Pro Val Leu Phe Ala Leu Ala
            595                 600                 605

Val Ala Phe Ala Ala Leu Trp Arg Ser Trp Gly Val Ala Pro Asp Val
    610                 615                 620

Val Ile Gly His Ser Met Gly Glu Val Ala Ala Ala His Val Ala Gly
625                 630                 635                 640
```

```
Ala Leu Ser Leu Glu Asp Ala Val Ala Ile Ile Cys Arg Arg Ser Arg
                645             650                 655

Leu Leu Arg Arg Ile Ser Gly Gln Gly Glu Met Ala Val Thr Glu Leu
            660             665                 670

Ser Leu Ala Glu Ala Glu Ala Ala Leu Arg Gly Tyr Glu Asp Arg Val
        675             680                 685

Ser Val Ala Val Ser Asn Ser Pro Arg Ser Thr Val Leu Ser Gly Glu
    690             695                 700

Pro Ala Ala Ile Gly Glu Val Leu Ser Ser Leu Asn Ala Lys Gly Val
705             710                 715                 720

Phe Cys Arg Arg Val Lys Val Asp Val Ala Ser His Ser Pro Gln Val
            725             730                 735

Asp Pro Leu Arg Glu Asp Leu Leu Ala Ala Leu Gly Gly Leu Arg Pro
            740             745                 750

Gly Ala Ala Ala Val Pro Met Arg Ser Thr Val Thr Gly Ala Met Val
            755             760                 765

Ala Gly Pro Glu Leu Gly Ala Asn Tyr Trp Met Asn Asn Leu Arg Gln
    770             775             780

Pro Val Arg Phe Ala Glu Val Val Gln Ala Gln Leu Gln Gly Gly His
785             790                 795                 800

Gly Leu Phe Val Glu Met Ser Pro His Pro Ile Leu Thr Thr Ser Val
            805             810                 815

Glu Glu Met Arg Arg Ala Ala Gln Arg Ala Gly Ala Ala Val Gly Ser
        820             825                 830

Leu Arg Arg Gly Gln Asp Glu Arg Pro Ala Met Leu Glu Ala Leu Gly
        835             840                 845

Thr Leu Trp Ala Gln Gly Tyr Pro Val Pro Trp Gly Arg Leu Phe Pro
    850             855                 860

Ala Gly Gly Arg Arg Val Pro Leu Pro Thr Tyr Pro Trp Gln Arg Glu
865             870             875                 880

Arg Tyr Trp Ile Glu Ala Pro Ala Lys Ser Ala Ala Gly Asp Arg Arg
            885             890                 895

Gly Val Arg Ala Gly Gly His Pro Leu Leu Gly Glu Met Gln Thr Leu
            900             905                 910

Ser Thr Gln Thr Ser Thr Arg Leu Trp Glu Thr Thr Leu Asp Leu Lys
        915             920                 925

Arg Leu Pro Trp Leu Gly Asp His Arg Val Gln Gly Ala Val Val Phe
    930             935                 940

Pro Gly Ala Ala Tyr Leu Glu Met Ala Ile Ser Ser Gly Ala Glu Ala
945             950                 955                 960

Leu Gly Asp Gly Pro Leu Gln Ile Thr Asp Val Val Leu Ala Glu Ala
            965             970                 975

Leu Ala Phe Ala Gly Asp Ala Ala Val Leu Val Gln Val Val Thr Thr
            980             985                 990
```

```
Glu Gln Pro Ser Gly Arg Leu Gln Phe Gln Ile Ala Ser Arg Ala Pro
         995                1000                1005

Gly Ala Gly His Ala Ser Phe Arg Val His Ala Arg Gly Ala Leu Leu
    1010              1015                1020

Arg Val Glu Arg Thr Glu Val Pro Ala Gly Leu Thr Leu Ser Ala Val
1025               1030                1035                1040

Arg Ala Arg Leu Gln Ala Ser Ile Pro Ala Ala Ala Thr Tyr Ala Glu
             1045                1050                1055

Leu Thr Glu Met Gly Leu Gln Tyr Gly Pro Ala Phe Gln Gly Ile Ala
             1060                1065                1070

Glu Leu Trp Arg Gly Glu Gly Glu Ala Leu Gly Arg Val Arg Leu Pro
         1075                1080                1085

Asp Ala Ala Gly Ser Ala Ala Glu Tyr Arg Leu His Pro Ala Leu Leu
    1090                1095                1100

Asp Ala Cys Phe Gln Ile Val Gly Ser Leu Phe Ala Arg Ser Gly Glu
1105                1110                1115                1120

Ala Thr Pro Trp Val Pro Val Glu Leu Gly Ser Leu Arg Leu Leu Gln
             1125                1130                1135

Arg Pro Ser Gly Glu Leu Trp Cys His Ala Arg Val Val Asn His Gly
         1140                1145                1150

His Gln Thr Pro Asp Arg Gln Gly Ala Asp Phe Trp Val Val Asp Ser
         1155                1160                1165

Ser Gly Ala Val Val Ala Glu Val Cys Gly Leu Val Ala Gln Arg Leu
    1170              1175                1180

Pro Gly Gly Val Arg Arg Arg Glu Glu Asp Asp Trp Phe Leu Glu Leu
1185              1190                1195                1200

Glu Trp Glu Pro Ala Ala Val Gly Thr Ala Lys Val Asn Ala Gly Arg
         1205                1210                1215

Trp Leu Leu Leu Gly Gly Gly Gly Gly Leu Gly Ala Ala Leu Arg Ala
         1220                1225                1230

Met Leu Glu Ala Gly Gly His Ala Val Val His Ala Ala Glu Asn Asn ,
    1235                1240                1245

Thr Ser Ala Ala Gly Val Arg Ala Leu Leu Ala Lys Ala Phe Asp Gly
    1250              1255                1260

Gln Ala Pro Thr Ala Val Val His Leu Gly Ser Leu Asp Gly Gly Gly
1265              1270                1275                1280

Glu Leu Asp Pro Gly Leu Gly Ala Gln Gly Ala Leu Asp Ala Pro Arg
             1285                1290                1295

Ser Ala Asp Val Ser Pro Asp Ala Leu Asp Pro Ala Leu Val Arg Gly
             1300                1305                1310

Cys Asp Ser Val Leu Trp Thr Val Gln Ala Leu Ala Gly Met Gly Phe
    1315                1320                1325

Arg Asp Ala Pro Arg Leu Trp Leu Leu Thr Arg Gly Ala Gln Ala Val
    1330              1335                1340
```

Gly Ala Gly Asp Val Ser Val Thr Gln Ala Pro Leu Leu Gly Leu Gly
1345   1350   1355   1360

Arg Val Ile Ala Met Glu His Ala Asp Leu Arg Cys Ala Arg Val Asp
            1365   1370   1375

Leu Asp Pro Ala Arg Pro Glu Gly Glu Leu Ala Ala Leu Leu Ala Glu
        1380   1385   1390

Leu Leu Ala Asp Asp Ala Glu Ala Glu Val Ala Leu Arg Gly Gly Glu
        1395   1400   1405

Arg Cys Val Ala Arg Ile Val Arg Arg Gln Pro Glu Thr Arg Pro Arg
    1410   1415   1420

Gly Arg Ile Glu Ser Cys Val Pro Thr Asp Val Thr Ile Arg Ala Asp
1425   1430   1435   1440

Ser Thr Tyr Leu Val Thr Gly Gly Leu Gly Gly Leu Gly Leu Ser Val
            1445   1450   1455

Ala Gly Trp Leu Ala Glu Arg Gly Ala Gly His Leu Val Leu Val Gly
            1460   1465   1470

Arg Ser Gly Ala Ala Ser Val Glu Gln Arg Ala Ala Val Ala Ala Leu
        1475   1480   1485

Glu Ala Arg Gly Ala Arg Val Thr Val Ala Lys Ala Asp Val Ala Asp
    1490   1495   1500

Arg Ala Gln Leu Glu Arg Ile Leu Arg Glu Val Thr Thr Ser Gly Met
1505   1510   1515   1520

Pro Leu Arg Gly Val Val His Ala Ala Gly Ile Leu Asp Asp Gly Leu
            1525   1530   1535

Leu Met Gln Gln Thr Pro Ala Arg Phe Arg Lys Val Met Ala Pro Lys
        1540   1545   1550

Val Gln Gly Ala Leu His Leu His Ala Leu Thr Arg Glu Ala Pro Leu
        1555   1560   1565

Ser Phe Phe Val Leu Tyr Ala Ser Gly Val Gly Leu Leu Gly Ser Pro
    1570   1575   1580

Gly Gln Gly Asn Tyr Ala Ala Ala Asn Thr Phe Leu Asp Ala Leu Ala
1585   1590   1595   1600

His His Arg Arg Ala Gln Gly Leu Pro Ala Leu Ser Val Asp Trp Gly
            1605   1610   1615

Leu Phe Ala Glu Val Gly Met Ala Ala Ala Gln Glu Asp Arg Gly Ala
        1620   1625   1630

Arg Leu Val Ser Arg Gly Met Arg Ser Leu Thr Pro Asp Glu Gly Leu
    1635   1640   1645

Ser Ala Leu Ala Arg Leu Leu Glu Ser Gly Arg Ala Gln Val Gly Val
    1650   1655   1660

Met Pro Val Asn Pro Arg Leu Trp Val Glu Leu Tyr Pro Ala Ala Ala
1665   1670   1675   1680

Ser Ser Arg Met Leu Ser Arg Leu Val Thr Ala His Arg Ala Ser Ala
        1685   1690   1695

Gly Gly Pro Ala Gly Asp Gly Asp Leu Leu Arg Arg Leu Ala Ala Ala
            1700   1705   1710

Glu Pro Ser Ala Arg Ser Ala Leu Leu Glu Pro Leu Leu Arg Ala Gln
      1715   1720   1725

Ile Ser Gln Val Leu Arg Leu Pro Glu Gly Lys Ile Glu Val Asp Ala
    1730   1735   1740

Pro Leu Thr Ser Leu Gly Met Asn Ser Leu Met Gly Leu Glu Leu Arg
1745   1750   1755   1760

Asn Arg Ile Glu Ala Met Leu Gly Ile Thr Val Pro Ala Thr Leu Leu
            1765   1770   1775

Trp Thr Tyr Pro Thr Val Ala Ala Leu Ser Gly His Leu Ala Arg Glu
          1780   1785   1790

Ala Cys Glu Ala Ala Pro Val Glu Ser Pro His Thr Thr Ala Asp Ser
          1795   1800   1805

Ala Val Glu Ile Glu Glu Met Ser Gln Asp Asp Leu Thr Gln Leu Ile
    1810   1815   1820

Ala Ala Lys Phe Lys Ala Leu Thr
1825   1830

<210> 5
<211> 7257
<212> PRT
<213> Sorangium cellulosum

<400> 5
Met Thr Thr Arg Gly Pro Thr Ala Gln Gln Asn Pro Leu Lys Gln Ala
  1   5   10   15

Ala Ile Ile Ile Gln Arg Leu Glu Glu Arg Leu Ala Gly Leu Ala Gln
            20   25   30

Ala Glu Leu Glu Arg Thr Glu Pro Ile Ala Ile Val Gly Ile Gly Cys
          35   40   45

Arg Phe Pro Gly Gly Ala Asp Ala Pro Glu Ala Phe Trp Glu Leu Leu
    50   55   60

Asp Ala Glu Arg Asp Ala Val Gln Pro Leu Asp Met Arg Trp Ala Leu
65   70   75   80

Val Gly Val Ala Pro Val Glu Ala Val Pro His Trp Ala Gly Leu Leu
              85   90   95

Thr Glu Pro Ile Asp Cys Phe Asp Ala Ala Phe Phe Gly Ile Ser Pro
            100   105   110

Arg Glu Ala Arg Ser Leu Asp Pro Gln His Arg Leu Leu Leu Glu Val
      115   120   125

Ala Trp Glu Gly Leu Glu Asp Ala Gly Ile Pro Pro Arg Ser Ile Asp
    130   135   140

Gly Ser Arg Thr Gly Val Phe Val Gly Ala Phe Thr Ala Asp Tyr Ala
145   150   155   160

Arg Thr Val Ala Arg Leu Pro Arg Glu Glu Arg Asp Ala Tyr Ser Ala
            165   170   175

```
Thr Gly Asn Met Leu Ser Ile Ala Ala Gly Arg Leu Ser Tyr Thr Leu
        180             185             190

Gly Leu Gln Gly Pro Cys Leu Thr Val Asp Thr Ala Cys Ser Ser Ser
        195             200             205

Leu Val Ala Ile His Leu Ala Cys Arg Ser Leu Arg Ala Gly Glu Ser
    210             215             220

Asp Leu Ala Leu Ala Gly Gly Val Ser Ala Leu Leu Ser Pro Asp Met
225             230             235             240

Met Glu Ala Ala Ala Arg Thr Gln Ala Leu Ser Pro Asp Gly Arg Cys
            245             250             255

Arg Thr Phe Asp Ala Ser Ala Asn Gly Phe Val Arg Gly Glu Gly Cys
        260             265             270

Gly Leu Val Val Leu Lys Arg Leu Ser Asp Ala Gln Arg Asp Gly Asp
        275             280             285

Arg Ile Trp Ala Leu Ile Arg Gly Ser Ala Ile Asn His Asp Gly Arg
    290             295             300

Ser Thr Gly Leu Thr Ala Pro Asn Val Leu Ala Gln Glu Thr Val Leu
305             310             315             320

Arg Glu Ala Leu Arg Ser Ala His Val Glu Ala Gly Ala Val Asp Tyr
            325             330             335

Val Glu Thr His Gly Thr Gly Thr Ser Leu Gly Asp Pro Ile Glu Val
            340             345             350

Glu Ala Leu Arg Ala Thr Val Gly Pro Ala Arg Ser Asp Gly Thr Arg
        355             360             365

Cys Val Leu Gly Ala Val Lys Thr Asn Ile Gly His Leu Glu Ala Ala
    370             375             380

Ala Gly Val Ala Gly Leu Ile Lys Ala Ala Leu Ser Leu Thr His Glu
385             390             395             400

Arg Ile Pro Arg Asn Leu Asn Phe Arg Thr Leu Asn Pro Arg Ile Arg
            405             410             415

Leu Glu Gly Ser Ala Leu Ala Leu Ala Thr Glu Pro Val Pro Trp Pro
            420             425             430

Arg Thr Asp Arg Pro Arg Phe Ala Gly Val Ser Ser Phe Gly Met Ser
        435             440             445

Gly Thr Asn Ala His Val Val Leu Glu Glu Ala Pro Ala Val Glu Leu
    450             455             460

Trp Pro Ala Ala Pro Glu Arg Ser Ala Glu Leu Leu Val Leu Ser Gly
465             470             475             480

Lys Ser Glu Gly Ala Leu Asp Ala Gln Ala Ala Arg Leu Arg Glu His
            485             490             495

Leu Asp Met His Pro Glu Leu Gly Leu Gly Asp Val Ala Phe Ser Leu
        500             505             510

Ala Thr Thr Arg Ser Ala Met Ser His Arg Leu Ala Val Ala Val Thr
        515             520             525
```

```
Ser Arg Glu Gly Leu Leu Ala Ala Leu Ser Ala Val Ala Gln Gly Gln
    530              535              540
```

```
Thr Pro Ala Gly Ala Ala Arg Cys Ile Ala Ser Ser Ser Arg Gly Lys
545              550              555              560
```

```
Leu Ala Phe Leu Phe Thr Gly Gln Gly Ala Gln Thr Pro Gly Met Gly
            565              570              575
```

```
Arg Gly Leu Cys Ala Ala Trp Pro Ala Phe Arg Glu Ala Phe Asp Arg
            580              585              590
```

```
Cys Val Ala Leu Phe Asp Arg Glu Leu Asp Arg Pro Leu Arg Glu Val
        595              600              605
```

```
Met Trp Ala Glu Ala Gly Ser Ala Glu Ser Leu Leu Leu Asp Gln Thr
    610              615              620
```

```
Ala Phe Thr Gln Pro Ala Leu Phe Ala Val Glu Tyr Ala Leu Thr Ala
625              630              635              640
```

```
Leu Trp Arg Ser Trp Gly Val Glu Pro Glu Leu Leu Val Gly His Ser
            645              650              655
```

```
Ile Gly Glu Leu Val Ala Ala Cys Val Ala Gly Val Phe Ser Leu Glu
            660              665              670
```

```
Asp Gly Val Arg Leu Val Ala Ala Arg Gly Arg Leu Met Gln Gly Leu
        675              680              685
```

```
Ser Ala Gly Gly Ala Met Val Ser Leu Gly Ala Pro Glu Ala Glu Val
    690              695              700
```

```
Ala Ala Ala Val Ala Pro His Ala Ala Ser Val Ser Ile Ala Ala Val
705              710              715              720
```

```
Asn Gly Pro Glu Gln Val Val Ile Ala Gly Val Glu Gln Ala Val Gln
            725              730              735
```

```
Ala Ile Ala Ala Gly Phe Ala Ala Arg Gly Ala Arg Thr Lys Arg Leu
        740              745              750
```

```
His Val Ser His Ala Phe His Ser Pro Leu Met Glu Pro Met Leu Glu
    755              760              765
```

```
Glu Phe Gly Arg Val Ala Ala Ser Val Thr Tyr Arg Arg Pro Ser Val
    770              775              780
```

```
Ser Leu Val Ser Asn Leu Ser Gly Lys Val Val Thr Asp Glu Leu Ser
785              790              795              800
```

```
Ala Pro Gly Tyr Trp Val Arg His Val Arg Glu Ala Val Arg Phe Ala
            805              810              815
```

```
Asp Gly Val Lys Ala Leu His Glu Ala Gly Ala Gly Thr Phe Val Glu
            820              825              830
```

```
Val Gly Pro Lys Pro Thr Leu Leu Gly Leu Leu Pro Ala Cys Leu Pro
            835              840              845
```

```
Glu Ala Glu Pro Thr Leu Leu Ala Ser Leu Arg Ala Gly Arg Glu Glu
    850              855              860
```

```
Ala Ala Gly Val Leu Glu Ala Leu Gly Arg Leu Trp Ala Ala Gly Gly
865              870              875              880
```

Ser Val Ser Trp Pro Gly Val Phe Pro Thr Ala Gly Arg Arg Val Pro
          885   890   895

Leu Pro Thr Tyr Pro Trp Gln Arg Gln Arg Tyr Trp Ile Glu Ala Pro
         900   905   910

Ala Glu Gly Leu Gly Ala Thr Ala Ala Asp Ala Leu Ala Gln Trp Phe
         915   920   925

Tyr Arg Val Asp Trp Pro Glu Met Pro Arg Ser Ser Val Asp Ser Arg
 930   935   940

Arg Ala Arg Ser Gly Gly Trp Leu Val Leu Ala Asp Arg Gly Gly Val
945   950   955   960

Gly Glu Ala Ala Ala Ala Ala Leu Ser Ser Gln Gly Cys Ser Cys Ala
         965   970   975

Val Leu His Ala Pro Ala Glu Ala Ser Ala Val Ala Glu Gln Val Thr
         980   985   990

Gln Ala Leu Gly Gly Arg Asn Asp Trp Gln Gly Val Leu Tyr Leu Trp
         995   1000   1005

Gly Leu Asp Ala Val Val Glu Ala Gly Ala Ser Ala Glu Glu Val Ala
  1010   1015   1020

Lys Val Thr His Leu Ala Ala Ala Pro Val Leu Ala Leu Ile Gln Ala
1025   1030   1035   1040

Leu Gly Thr Gly Pro Arg Ser Pro Arg Leu Trp Ile Val Thr Arg Gly
         1045   1050   1055

Ala Cys Thr Val Gly Gly Glu Pro Asp Ala Ala Pro Cys Gln Ala Ala
         1060   1065   1070

Leu Trp Gly Met Gly Arg Val Ala Ala Leu Glu His Pro Gly Ser Trp
      1075   1080   1085

Gly Gly Leu Val Asp Leu Asp Pro Glu Glu Ser Pro Thr Glu Val Glu
  1090   1095   1100

Ala Leu Val Ala Glu Leu Leu Ser Pro Asp Ala Glu Asp Gln Leu Ala
1105   1110   1115   1120

Phe Arg Gln Gly Arg Arg Arg Ala Ala Arg Leu Val Ala Ala Pro Pro
         1125   1130   1135

Glu Gly Asn Ala Ala Pro Val Ser Leu Ser Ala Glu Gly Ser Tyr Leu
     1140   1145   1150

Val Thr Gly Gly Leu Gly Ala Leu Gly Leu Leu Val Ala Arg Trp Leu
    1155   1160   1165

Val Glu Arg Gly Ala Gly His Leu Val Leu Ile Ser Arg His Gly Leu
   1170   1175   1180

Pro Asp Arg Glu Glu Trp Gly Arg Asp Gln Pro Pro Glu Val Arg Ala
1185   1190   1195   1200

Arg Ile Ala Ala Ile Glu Ala Leu Glu Ala Gln Gly Ala Arg Val Thr
         1205   1210   1215

Val Ala Ala Val Asp Val Ala Asp Ala Glu Gly Met Ala Ala Leu Leu
    1220   1225   1230

```
Ala Ala Val Glu Pro Pro Leu Arg Gly Val Val His Ala Ala Gly Leu
    1235            1240            1245

Leu Asp Asp Gly Leu Leu Ala His Gln Asp Ala Gly Arg Leu Ala Arg
    1250            1255            1260

Val Leu Arg Pro Lys Val Glu Gly Ala Trp Val Leu His Thr Leu Thr
1265            1270            1275            1280

Arg Glu Gln Pro Leu Asp Leu Phe Val Leu Phe Ser Ser Ala Ser Gly
            1285            1290            1295

Val Phe Gly Ser Ile Gly Gln Gly Ser Tyr Ala Ala Gly Asn Ala Phe
        1300            1305            1310

Leu Asp Ala Leu Ala Asp Leu Arg Arg Thr Gln Gly Leu Ala Ala Leu
    1315            1320            1325

Ser Ile Ala Trp Gly Leu Trp Ala Glu Gly Gly Met Gly Ser Gln Ala
    1330            1335            1340

Gln Arg Arg Glu His Glu Ala Ser Gly Ile Trp Ala Met Pro Thr Ser
1345            1350            1355            1360

Arg Ala Leu Ala Ala Met Glu Trp Leu Leu Gly Thr Arg Ala Thr Gln
            1365            1370            1375

Arg Val Val Ile Gln Met Asp Trp Ala His Ala Gly Ala Ala Pro Arg
        1380            1385            1390

Asp Ala Ser Arg Gly Arg Phe Trp Asp Arg Leu Val Thr Ala Thr Lys
        1395            1400            1405

Glu Ala Ser Ser Ser Ala Val Pro Ala Val Glu Arg Trp Arg Asn Ala
    1410            1415            1420

Ser Val Val Glu Thr Arg Ser Ala Leu Tyr Glu Leu Val Arg Gly Val
1425            1430            1435            1440

Val Ala Gly Val Met Gly Phe Thr Asp Gln Gly Thr Leu Asp Val Arg
        1445            1450            1455

Arg Gly Phe Ala Glu Gln Gly Leu Asp Ser Leu Met Ala Val Glu Ile
        1460            1465            1470

Arg Lys Arg Leu Gln Gly Glu Leu Gly Met Pro Leu Ser Ala Thr Leu
    1475            1480            1485

Ala Phe Asp His Pro Thr Val Glu Arg Leu Val Glu Tyr Leu Leu Ser
    1490            1495            1500

Gln Ala Leu Glu Leu Gln Asp Arg Thr Asp Val Arg Ser Val Arg Leu
1505            1510            1515            1520

Pro Ala Thr Glu Asp Pro Ile Ala Ile Val Gly Ala Ala Cys Arg Phe
        1525            1530            1535

Pro Gly Gly Val Glu Asp Leu Glu Ser Tyr Trp Gln Leu Leu Thr Glu
        1540            1545            1550

Gly Val Val Val Ser Thr Glu Val Pro Ala Asp Arg Trp Asn Gly Ala
    1555            1560            1565

Asp Gly Arg Val Pro Gly Ser Gly Glu Ala Gln Arg Gln Thr Tyr Val
    1570            1575            1580
```

Pro Arg Gly Gly Phe Leu Arg Glu Val Glu Thr Phe Asp Ala Ala Phe
1585   1590   1595   1600

Phe His Ile Ser Pro Arg Glu Ala Met Ser Leu Asp Pro Gln Gln Arg
          1605   1610   1615

Leu Leu Leu Glu Val Ser Trp Glu Ala Ile Glu Arg Ala Gly Gln Asp
          1620   1625   1630

Pro Ser Ala Leu Arg Glu Ser Pro Thr Gly Val Phe Val Gly Ala Gly
     1635   1640   1645

Pro Asn Glu Tyr Ala Glu Arg Val Gln Glu Leu Ala Asp Glu Ala Ala
  1650   1655   1660

Gly Leu Tyr Ser Gly Thr Gly Asn Met Leu Ser Val Ala Ala Gly Arg
1665   1670   1675   1680

Leu Ser Phe Phe Leu Gly Leu His Gly Pro Thr Leu Ala Val Asp Thr
          1685   1690   1695

Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Gly Cys Gln Ser Leu
          1700   1705   1710

Arg Arg Gly Glu Cys Asp Gln Ala Leu Val Gly Gly Val Asn Met Leu
     1715   1720   1725

Leu Ser Pro Lys Thr Phe Ala Leu Leu Ser Arg Met His Ala Leu Ser
     1730   1735   1740

Pro Gly Gly Arg Cys Lys Thr Phe Ser Ala Asp Ala Asp Gly Tyr Ala
1745   1750   1755   1760

Arg Ala Glu Gly Cys Ala Val Val Val Leu Lys Arg Leu Ser Asp Ala
          1765   1770   1775

Gln Arg Asp Arg Asp Pro Ile Leu Ala Val Ile Arg Gly Thr Ala Ile
          1780   1785   1790

Asn His Asp Gly Pro Ser Ser Gly Leu Thr Val Pro Ser Gly Pro Ala
     1795 .   1800   1805

Gln Glu Ala Leu Leu Arg Gln Ala Leu Ala His Ala Gly Val Val Pro
     1810   1815   1820

Ala Asp Val Asp Phe Val Glu Cys His Gly Thr Gly Thr Ala Leu Gly
1825   1830   1835   1840

Asp Pro Ile Glu Val Arg Ala Leu Ser Asp Val Tyr Gly Gln Ala Arg
          1845   1850   1855

Pro Ala Asp Arg Pro Leu Ile Leu Gly Ala Ala Lys Ala Asn Leu Gly
     1860   1865   1870

His Met Glu Pro Ala Ala Gly Leu Ala Gly Leu Leu Lys Ala Val Leu
     1875   1880   1885

Ala Leu Gly Gln Glu Gln Ile Pro Ala Gln Pro Glu Leu Gly Glu Leu
     1890   1895   1900

Asn Pro Leu Leu Pro Trp Glu Ala Leu Pro Val Ala Val Ala Arg Ala
1905   1910   1915   1920

Ala Val Pro Trp Pro Arg Thr Asp Arg Pro Arg Phe Ala Gly Val Ser
          1925   1930   1935

Ser Phe Gly Met .Ser Gly Thr Asn Ala His Val Val Leu Glu Glu Ala
     1940   1945   1950

Pro Ala Val Glu Leu Trp Pro Ala Ala Pro Glu Arg Ser Ala Glu Leu
     1955   1960   1965

Leu Val Leu Ser Gly Lys Ser Glu Gly Ala Leu Asp Ala Gln Ala Ala
  1970   1975   1980

Arg Leu Arg Glu His Leu Asp Met His Pro Glu Leu Gly Leu Gly Asp
1985   1990   1995   2000

Val Ala Phe Ser Leu Ala Thr Thr Arg Ser Ala Met Asn His Arg Leu
     2005   2010   2015

Ala Val Ala Val Thr Ser Arg Glu Gly Leu Leu Ala Ala Leu Ser Ala
      2020   2025   2030

Val Ala Gln Gly Gln Thr Pro Pro Gly Ala Ala Arg Cys Ile Ala Ser
      2035   2040   2045

Ser Ser Arg Gly Lys Leu Ala Phe Leu Phe Thr Gly Gln Gly Ala Gln
   2050   2055   2060

Thr Pro Gly Met Gly Arg Gly Leu Cys Ala Ala Trp Pro Ala Phe Arg
2065   2070   2075   2080

Glu Ala Phe Asp Arg Cys Val Ala Leu Phe Asp Arg Glu Leu Asp Arg
       2085   2090   2095

Pro Leu Arg Glu Val Met Trp Ala Glu Pro Gly Ser Ala Glu Ser Leu
      2100   2105   2110

Leu Leu Asp Gln Thr Ala Phe Thr Gln Pro Ala Leu Phe Thr Val Glu
      2115   2120   2125

Tyr Ala Leu Thr Ala Leu Trp Arg Ser Trp Gly Val Glu Pro Glu Leu
  2130   2135   2140

Val Ala Gly His Ser Ala Gly Glu Leu Val Ala Ala Cys Val Ala Gly
2145   2150   2155   2160

Val Phe Ser Leu Glu Asp Gly Val Arg Leu Val Ala Ala Arg Gly Arg
      2165   2170   2175

Leu Met Gln Gly Leu Ser Ala Gly Gly Ala Met Val Ser Leu Gly Ala
      2180   2185   2190

Pro Glu Ala Glu Val Ala Ala Ala Val Ala Pro His Ala Ala Ser Val
     2195   2200   2205

Ser Ile Ala Ala Val Asn Gly Pro Glu Gln Val Val Ile Ala Gly Val
   2210   2215   2220

Glu Gln Ala Val Gln Ala Ile Ala Ala Gly Phe Ala Ala Arg Gly Ala
2225   2230   2235   2240

Arg Thr Lys Arg Leu His Val Ser His Ala Ser His Ser Pro Leu Met
       2245   2250   2255

Glu Pro Met Leu Glu Glu Phe Gly Arg Val Ala Ala Ser Val Thr Tyr
     2260   2265   2270

Arg Arg Pro Ser Val Ser Leu Val Ser Asn Leu Ser Gly Lys Val Val
     2275   2280   2285

```
Ala Asp Glu Leu Ser Ala Pro Gly Tyr Trp Val Arg His Val Arg Glu
  2290            2295            2300

Ala Val Arg Phe Ala Asp Gly Val Lys Ala Leu His Glu Ala Gly Ala
2305            2310            2315            2320

Gly Thr Phe Val Glu Val Gly Pro Lys Pro Thr Leu Leu Gly Leu Leu
            2325            2330            2335

Pro Ala Cys Leu Pro Glu Ala Glu Pro Thr Leu Leu Ala Ser Leu Arg
            2340            2345            2350

Ala Gly Arg Glu Glu Ala Ala Gly Val Leu Glu Ala Leu Gly Arg Leu
        2355            2360            2365

Trp Ala Ala Gly Gly Ser Val Ser Trp Pro Gly Val Phe Pro Thr Ala
    2370            2375            2380

Gly Arg Arg Val Pro Leu Pro Thr Tyr Pro Trp Gln Arg Gln Arg Tyr
2385            2390            2395            2400

Trp Pro Asp Ile Glu Pro Asp Ser Arg Arg His Ala Ala Ala Asp Pro
            2405            2410            2415

Thr Gln Gly Trp Phe Tyr Arg Val Asp Trp Pro Glu Ile Pro Arg Ser
            2420            2425            2430

Leu Gln Lys Ser Glu Glu Ala Ser Arg Gly Ser Trp Leu Val Leu Ala
        2435            2440            2445

Asp Lys Gly Gly Val Gly Glu Ala Val Ala Ala Ala Leu Ser Thr Arg
    2450            2455            2460

Gly Leu Pro Cys Val Val Leu His Ala Pro Ala Glu Thr Ser Ala Thr
2465            2470            2475            2480

Ala Glu Leu Val Thr Glu Ala Ala Gly Gly Arg Ser Asp Trp Gln Val
            2485            2490            2495

Val Leu Tyr Leu Trp Gly Leu Asp Ala Val Val Gly Ala Glu Ala Ser
        2500            2505            2510

Ile Asp Glu Ile Gly Asp Ala Thr Arg Arg Ala Thr Ala Pro Val Leu
    2515            2520            2525

Gly Leu Ala Arg Phe Leu Ser Thr Val Ser Cys Ser Pro Arg Leu Trp
    2530            2535            2540

Val Val Thr Arg Gly Ala Cys Ile Val Gly Asp Glu Pro Ala Ile Ala
2545            2550            2555            2560

Pro Cys Gln Ala Ala Leu Trp Gly Met Gly Arg Val Ala Ala Leu Glu
            2565            2570            2575

His Pro Gly Ala Trp Gly Gly Leu Val Asp Leu Asp Pro Arg Ala Ser
        2580            2585            2590

Pro Pro Gln Ala Ser Pro Ile Asp Gly Glu Met Leu Val Thr Glu Leu
    2595            2600            2605

Leu Ser Gln Glu Thr Glu Asp Gln Leu Ala Phe Arg His Gly Arg Arg
  2610            2615            2620

His Ala Ala Arg Leu Val Ala Ala Pro Pro Gln Gly Gln Ala Ala Pro
2625            2630            2635            2640
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Val Ser Leu Ser Ala Glu Ala Ser Tyr Leu Val Thr Gly Gly Leu Gly
          2645                2650                2655

Gly Leu Gly Leu Ile Val Ala Gln Trp Leu Val Glu Leu Gly Ala Arg
          2660                2665                2670

His Leu Val Leu Thr Ser Arg Arg Gly Leu Pro Asp Arg Gln Ala Trp
          2675                2680                2685

Cys Glu Gln Gln Pro Pro Glu Ile Arg Ala Arg Ile Ala Ala Val Glu
     2690                2695                2700

Ala Leu Glu Ala Arg Gly Ala Arg Val Thr Val Ala Ala Val Asp Val
2705                2710                2715                2720

Ala Asp Val Glu Pro Met Thr Ala Leu Val Ser Ser Val Glu Pro Pro
               2725                2730                2735

Leu Arg Gly Val Val His Ala Ala Gly Val Ser Val Met Arg Pro Leu
          2740                2745                2750

Ala Glu Thr Asp Glu Thr Leu Leu Glu Ser Val Leu Arg Pro Lys Val
          2755                2760                2765

Ala Gly Ser Trp Leu Leu His Arg Leu Leu His Gly Arg Pro Leu Asp
     2770                2775                2780

Leu Phe Val Leu Phe Ser Ser Gly Ala Ala Val Trp Gly Ser His Ser
2785                2790                2795                2800

Gln Gly Ala Tyr Ala Ala Ala Asn Ala Phe Leu Asp Gly Leu Ala His
          2805                2810                2815

Leu Arg Arg Ser Gln Ser Leu Pro Ala Leu Ser Val Ala Trp Gly Leu
          2820                2825                2830

Trp Ala Glu Gly Gly Met Ala Asp Ala Glu Ala His Ala Arg Leu Ser
          2835                2840                2845

Asp Ile Gly Val Leu Pro Met Ser Thr Ser Ala Ala Leu Ser Ala Leu
     2850                2855                2860

Gln Arg Leu Val Glu Thr Gly Ala Ala Gln Arg Thr Val Thr Arg Met
2865                2870                2875                2880

Asp Trp Ala Arg Phe Ala Pro Val Tyr Thr Ala Arg Gly Arg Arg Asn
          2885                2890                2895

Leu Leu Ser Ala Leu Val Ala Gly Arg Asp Ile Ile Ala Pro Ser Pro
          2900                2905                2910

Pro Ala Ala Ala Thr Arg Asn Trp Arg Gly Leu Ser Val Ala Glu Ala
     2915                2920                2925

Arg Val Ala Leu His Glu Ile Val His Gly Ala Val Ala Arg Val Leu
     2930                2935                2940

Gly Phe Leu Asp Pro Ser Ala Leu Asp Pro Gly Met Gly Phe Asn Glu
2945                2950                2955                2960

Gln Gly Leu Asp Ser Leu Met Ala Val Glu Ile Arg Asn Leu Leu Gln
          2965                2970                2975

Ala Glu Leu Asp Val Arg Leu Ser Thr Thr Leu Ala Phe Asp His Pro
          2980                2985                2990
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Thr Val Gln Arg Leu Val Glu His Leu Leu Val Asp Val Leu Lys Leu
     2995   3000   3005

Glu Asp Arg Ser Asp Thr Gln His Val Arg Ser Leu Ala Ser Asp Glu
     3010   3015   3020

Pro Ile Ala Ile Val Gly Ala Ala Cys Arg Phe Pro Gly Gly Val Glu
3025   3030   3035   3040

Asp Leu Glu Ser Tyr Trp Gln Leu Leu Ala Glu Gly Val Val Val Ser
           3045   3050   3055

Ala Glu Val Pro Ala Asp Arg Trp Asp Ala Ala Asp Trp Tyr Asp Pro
          3060   3065   3070

Asp Pro Glu Ile Pro Gly Arg Thr Tyr Val Thr Lys Gly Ala Phe Leu
     3075   3080   3085

Arg Asp Leu Gln Arg Leu Asp Ala Thr Phe Phe Arg Ile Ser Pro Arg
     3090   3095   3100

Glu Ala Met Ser Leu Asp Pro Gln Gln Arg Leu Leu Leu Glu Val Ser
3105   3110   3115   3120

Trp Glu Ala Leu Glu Ser Ala Gly Ile Ala Pro Asp Thr Leu Arg Asp
          3125   3130   3135

Ser Pro Thr Gly Val Phe Val Gly Ala Gly Pro Asn Glu Tyr Tyr Thr
          3140   3145   3150

Gln Arg Leu Arg Gly Phe Thr Asp Gly Ala Ala Gly Leu Tyr Gly Gly
          3155   3160   3165

Thr Gly Asn Met Leu Ser Val Thr Ala Gly Arg Leu Ser Phe Phe Leu
     3170   3175   3180

Gly Leu His Gly Pro Thr Leu Ala Met Asp Thr Ala Cys Ser Ser Ser
3185   3190   3195   3200

Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Leu Gly Glu Cys
          3205   3210   3215

Asp Gln Ala Leu Val Gly Gly Val Asn Val Leu Leu Ala Pro Glu Thr
          3220   3225   3230

Phe Val Leu Leu Ser Arg Met Arg Ala Leu Ser Pro Asp Gly Arg Cys
          3235   3240   3245

Lys Thr Phe Ser Ala Asp Ala Asp Gly Tyr Ala Arg Gly Glu Gly Cys
     3250   3255   3260

Ala Val Val Val Leu Lys Arg Leu Arg Asp Ala Gln Arg Ala Gly Asp
3265   3270   3275   3280

Ser Ile Leu Ala Leu Ile Arg Gly Ser Ala Val Asn His Asp Gly Pro
          3285   3290   3295

Ser Ser Gly Leu Thr Val Pro Asn Gly Pro Ala Gln Gln Ala Leu Leu
          3300   3305   3310

Arg Gln Ala Leu Ser Gln Ala Gly Val Ser Pro Val Asp Val Asp Phe
     3315   3320   3325

Val Glu Cys His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile Glu Val
     3330   3335   3340

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Gln Ala Leu Ser Glu Val Tyr Gly Pro Gly Arg Ser Gly Asp Arg Pro
3345                3350                3355                3360

Leu Val Leu Gly Ala Ala Lys Ala Asn Val Ala His Leu Glu Ala Ala
             3365                3370                3375

Ser Gly Leu Ala Ser Leu Leu Lys Ala Val Leu Ala Leu Arg His Glu
          3380                3385                3390

Gln Ile Pro Ala Gln Pro Glu Leu Gly Glu Leu Asn Pro His Leu Pro
       3395                3400                3405

Trp Asn Thr Leu Pro Val Ala Val Pro Arg Lys Ala Val Pro Trp Gly
    3410                3415                3420

Arg Gly Ala Arg Pro Arg Arg Ala Gly Val Ser Ala Phe Gly Leu Ser
3425                3430                3435                3440

Gly Thr Asn Val His Val Val Leu Glu Glu Ala Pro Glu Val Glu Pro
          3445                3450                3455

Ala Pro Ala Ala Pro Ala Arg Pro Val Glu Leu Val Val Leu Ser Ala
       3460                3465                3470

Lys Ser Ala Ala Ala Leu Asp Ala Ala Ala Ala Arg Leu Ser Ala His
    3475                3480                3485

Leu Ser Ala His Pro Glu Leu Ser Leu Gly Asp Val Ala Phe Ser Leu
   3490                3495                3500

Ala Thr Thr Arg Ser Pro Met Glu His Arg Leu Ala Ile Ala Thr Thr
3505                3510                3515                3520

Ser Arg Glu Ala Leu Arg Gly Ala Leu Asp Ala Ala Ala Gln Gln Lys
          3525                3530                3535

Thr Pro Gln Gly Ala Val Arg Gly Lys Ala Val Ser Ser Arg Gly Lys
       3540                3545                3550

Leu Ala Phe Leu Phe Thr Gly Gln Gly Ala Gln Met Pro Gly Met Gly
    3555      .           3560                3565

Arg Gly Leu Tyr Glu Thr Trp Pro Ala Phe Arg Glu Ala Phe Asp Arg
    3570                3575                3580

Cys Val Ala Leu Phe Asp Arg Glu Ile Asp Gln Pro Leu Arg Glu Val
3585                3590                3595                3600

Met Trp Ala Ala Pro Gly Leu Ala Gln Ala Ala Arg Leu Asp Gln Thr
          3605                3610                3615

Ala Tyr Ala Gln Pro Ala Leu Phe Ala Leu Glu Tyr Ala Leu Ala Ala
       3620                3625                3630

Leu Trp Arg Ser Trp Gly Val Glu Pro His Val Leu Leu Gly His Ser
    3635                3640                3645

Ile Gly Glu Leu Val Ala Ala Cys Val Ala Gly Val Phe Ser Leu Glu
    3650                3655                3660

Asp Ala Val Arg Leu Val Ala Ala Arg Gly Arg Leu Met Gln Ala Leu
3665                3670                3675                3680

Pro Ala Gly Gly Ala Met Val Ala Ile Ala Ala Ser Glu Ala Glu Val
          3685                3690                3695
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Ala Ala Ser Val Ala Pro His Ala Ala Thr Val Ser Ile Ala Ala Val
         3700          3705               3710

Asn Gly Pro Asp Ala Val Val Ile Ala Gly Ala Glu Val Gln Val Leu
         3715          3720               3725

Ala Leu Gly Ala Thr Phe Ala Ala Arg Gly Ile Arg Thr Lys Arg Leu
    3730          3735               3740

Ala Val Ser His Ala Phe His Ser Pro Leu Met Asp Pro Met Leu Glu
3745               3750               3755                  3760

Asp Phe Gln Arg Val Ala Ala Thr Ile Ala Tyr Arg Ala Pro Asp Arg
             3765               3770               3775

Pro Val Val Ser Asn Val Thr Gly His Val Ala Gly Pro Glu Ile Ala
             3780               3785               3790

Thr Pro Glu Tyr Trp Val Arg His Val Arg Ser Ala Val Arg Phe Gly
         3795               3800               3805

Asp Gly Ala Lys Ala Leu His Ala Ala Gly Ala Ala Thr Phe Val Glu
    3810               3815               3820

Val Gly Pro Lys Pro Val Leu Leu Gly Leu Leu Pro Ala Cys Leu Gly
3825               3830               3835                  3840

Glu Ala Asp Ala Val Leu Val Pro Ser Leu Arg Ala Asp Arg Ser Glu
             3845               3850               3855

Cys Glu Val Val Leu Ala Ala Leu Gly Ala Trp Tyr Ala Trp Gly Gly
         3860               3865               3870

Ala Leu Asp Trp Lys Gly Val Phe Pro Asp Gly Ala Arg Arg Val Ala
    3875               3880               3885

Leu Pro Met Tyr Pro Trp Gln Arg Glu Arg His Trp Met Asp Leu Thr
    3890               3895               3900

Pro Arg Ser Ala Ala Pro Ala Gly Ile Ala Gly Arg Trp Pro Leu Ala
3905               3910               3915                  3920

Gly Val Gly Leu Cys Met Pro Gly Ala Val Leu His His Val Leu Ser
         3925               3930               3935

Ile Gly Pro Arg His Gln Pro Phe Leu Gly Asp His Leu Val Phe Gly
    3940               3945               3950

Lys Val Val Val Pro Gly Ala Phe His Val Ala Val Ile Leu Ser Ile
    3955               3960               3965

Ala Ala Glu Arg Trp Pro Glu Arg Ala Ile Glu Leu Thr Gly Val Glu
    3970               3975               3980

Phe Leu Lys Ala Ile Ala Met Glu Pro Asp Gln Glu Val Glu Leu His
3985               3990               3995                  4000

Ala Val Leu Thr Pro Glu Ala Ala Gly Asp Gly Tyr Leu Phe Glu Leu
             4005               4010               4015

Ala Thr Leu Ala Ala Pro Glu Thr Glu Arg Arg Trp Thr Thr His Ala
         4020               4025               4030

Arg Gly Arg Val Gln Pro Thr Asp Gly Ala Pro Gly Ala Leu Pro Arg
    4035               4040               4045
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Leu Glu Val Leu Glu Asp Arg Ala Ile Gln Pro Leu Asp Phe Ala Gly
    4050                4055                4060

Phe Leu Asp Arg Leu Ser Ala Val Arg Ile Gly Trp Gly Pro Leu Trp
4065            4070                4075                4080

Arg Trp Leu Gln Asp Gly Arg Val Gly Asp Glu Ala Ser Leu Ala Thr
            4085                4090                4095

Leu Val Pro Thr Tyr Pro Asn Ala His Asp Val Ala Pro Leu His Pro
            4100                4105                4110

Ile Leu Leu Asp Asn Gly Phe Ala Val Ser Leu Leu Ser Thr Arg Ser
        4115                4120                4125

Glu Pro Glu Asp Asp Gly Thr Pro Pro Leu Pro Phe Ala Val Glu Arg
    4130                4135                4140

Val Arg Trp Trp Arg Ala Pro Val Gly Arg Val Arg Cys Gly Gly Val
4145            4150                4155                4160

Pro Arg Ser Gln Ala Phe Gly Val Ser Ser Phe Val Leu Val Asp Glu
            4165                4170                4175

Thr Gly Glu Val Val Ala Glu Val Glu Gly Phe Val Cys Arg Arg Ala
            4180                4185                4190

Pro Arg Glu Val Phe Leu Arg Gln Glu Ser Gly Ala Ser Thr Ala Ala
        4195                4200                4205

Leu Tyr Arg Leu Asp Trp Pro Glu Ala Pro Leu Pro Asp Ala Pro Ala
    4210                4215                4220

Glu Arg Ile Glu Glu Ser Trp Val Val Val Ala Ala Pro Gly Ser Glu
4225            4230                4235                4240

Met Ala Ala Ala Leu Ala Thr Arg Leu Asn Arg Cys Val Leu Ala Glu
            4245                4250                4255

Pro Lys Gly Leu Glu Ala Ala Leu Ala Gly Val Ser Pro Ala Gly Val
        4260                4265                4270

Ile Cys Leu Trp Glu Ala Gly Ala His Glu Glu Ala Pro Ala Ala Ala
    4275                4280                4285

Gln Arg Val Ala Thr Glu Gly Leu Ser Val Val Gln Ala Leu Arg Asp
    4290                4295                4300

Arg Ala Val Arg Leu Trp Trp Val Thr Met Gly Ala Val Ala Val Glu
4305            4310                4315                4320

Ala Gly Glu Arg Val Gln Val Ala Thr Ala Pro Val Trp Gly Leu Gly
            4325                4330                4335

Arg Thr Val Met Gln Glu Arg Pro Glu Leu Ser Cys Thr Leu Val Asp
        4340                4345                4350

Leu Glu Pro Glu Ala Asp Ala Ala Arg Ser Ala Asp Val Leu Leu Arg.
        4355                4360                4365

Glu Leu Gly Arg Ala Asp Asp Glu Thr Gln Val Ala Phe Arg Ser Gly
    4370                4375                4380

Lys Arg Arg Val Ala Arg Leu Val Lys Ala Thr Thr Pro Glu Gly Leu
4385            4390                4395                4400
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Leu Val Pro Asp Ala Glu Ser Tyr Arg Leu Glu Ala Gly Gln Lys Gly
            4405   4410   4415

Thr Leu Asp Gln Leu Arg Leu Ala Pro Ala Gln Arg Arg Ala Pro Gly
            4420   4425   4430

Pro Gly Glu Val Glu Ile Lys Val Thr Ala Ser Gly Leu Asn Phe Arg
            4435   4440   4445

Thr Val Leu Ala Val Leu Gly Met Tyr Pro Gly Asp Ala Gly Pro Met
     4450   4455   4460

Gly Gly Asp Cys Ala Gly Val Ala Thr Ala Val Gly Gln Gly Val Arg
4465   4470   4475   4480

His Val Ala Val Gly Asp Ala Val Met Thr Leu Gly Thr Leu His Arg
            4485   4490   4495

Phe Val Thr Val Asp Ala Arg Leu Val Val Arg Gln Pro Ala Gly Leu
            4500   4505   4510

Thr Pro Ala Gln Ala Ala Thr Val Pro Val Ala Phe Leu Thr Ala Trp
     4515   4520   4525

Leu Ala Leu His Asp Leu Gly Asn Leu Arg Arg Gly Glu Arg Val Leu
     4530   4535   4540

Ile His Ala Ala Ala Gly Gly Val Gly Met Ala Ala Val Gln Ile Ala
4545   4550   4555   4560

Arg Trp Ile Gly Ala Glu Val Phe Ala Thr Ala Ser Pro Ser Lys Trp
            4565   4570   4575

Ala Ala Val Gln Ala Met Gly Val Pro Arg Thr His Ile Ala Ser Ser
            4580   4585   4590

Arg Thr Leu Glu Phe Ala Glu Thr Phe Arg Gln Val Thr Gly Gly Arg
            4595   4600   4605

Gly Val Asp Val Val Leu Asn Ala Leu Ala Gly Glu Phe Val Asp Ala
     4610   4615   4620

Ser Leu Ser Leu Leu Ser Thr Gly Gly Arg Phe Leu Glu Met Gly Lys
4625   4630   4635   4640

Thr Asp Ile Arg Asp Arg Ala Ala Val Ala Ala Ala His Pro Gly Val
            4645   4650   4655

Arg Tyr Arg Val Phe Asp Ile Leu Glu Leu Ala Pro Asp Arg Thr Arg
            4660   4665   4670

Glu Ile Leu Glu Arg Val Val Glu Gly Phe Ala Ala Gly His Leu Arg
     4675   4680   4685

Ala Leu Pro Val His Ala Phe Ala Ile Thr Lys Ala Glu Ala Ala Phe
     4690   4695   4700

Arg Phe Met Ala Gln Ala Arg His Gln Gly Lys Val Val Leu Leu Pro
4705   4710   4715   4720

Ala Pro Ser Ala Ala Pro Leu Ala Pro Thr Gly Thr Val Leu Leu Thr
            4725   4730   4735

Gly Gly Leu Gly Ala Leu Gly Leu His Val Ala Arg Trp Leu Ala Gln
            4740   4745   4750

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Gln Gly Val Pro His Met Val Leu Thr Gly Arg Arg Gly Leu Asp Thr
    4755                4760            4765

Pro Gly Ala Ala Lys Ala Val Ala Glu Ile Glu Ala Leu Gly Ala Arg
    4770            4775            4780

Val Thr Ile Ala Ala Ser Asp Val Ala Asp Arg Asn Ala Leu Glu Ala
4785            4790            4795            4800

Val Leu Gln Ala Ile Pro Ala Glu Trp Pro Leu Gln Gly Val Ile His
            4805            4810            4815

Ala Ala Gly Ala Leu Asp Asp Gly Val Leu Asp Glu Gln Thr Thr Asp
    4820            4825            4830

Arg Phe Ser Arg Val Leu Ala Pro Lys Val Thr Gly Ala Trp Asn Leu
    4835            4840            4845

His Glu Leu Thr Ala Gly Asn Asp Leu Ala Phe Phe Val Leu Phe Ser
    4850            4855            4860

Ser Met Ser Gly Leu Leu Gly Ser Ala Gly Gln Ser Asn Tyr Ala Ala
4865            4870            4875            4880

Ala Asn Thr Phe Leu Asp Ala Leu Ala Ala His Arg Arg Ala Glu Gly
            4885            4890            4895

Leu Ala Ala Gln Ser Leu Ala Trp Gly Pro Trp Ser Asp Gly Gly Met
    4900            4905            4910

Ala Ala Gly Leu Ser Ala Ala Leu Gln Ala Arg Leu Ala Arg His Gly
    4915            4920            4925

Met Gly Ala Leu Ser Pro Ala Gln Gly Thr Ala Leu Leu Gly Gln Ala
    4930            4935            4940

Leu Ala Arg Pro Glu Thr Gln Leu Gly Ala Met Ser Leu Asp Val Arg
4945            4950            4955            4960

Ala Ala Ser Gln Ala Ser Gly Ala Ala Val Pro Pro Val Trp Arg Ala
            4965            4970            4975

Leu Val Arg Ala Glu Ala Arg His Thr Ala Ala Gly Ala Gln Gly Ala
            4980            4985            4990

Leu Ala Ala Arg Leu Gly Ala Leu Pro Glu Ala Arg Arg Ala Asp Glu
    4995            5000            5005

Val Arg Lys Val Val Gln Ala Glu Ile Ala Arg Val Leu Ser Trp Ser
    5010            5015            5020

Ala Ala Ser Ala Val Pro Val Asp Arg Pro Leu Ser Asp Leu Gly Leu
5025            5030            5035            5040

Asp Ser Leu Thr Ala Val Glu Leu Arg Asn Val Leu Gly Gln Arg Val
            5045            5050            5055

Gly Ala Thr Leu Pro Ala Thr Leu Ala Phe Asp His Pro Thr Val Asp
        5060            5065            5070

Ala Leu Thr Arg Trp Leu Leu Asp Lys Val Leu Ala Val Ala Glu Pro
    5075            5080            5085

Ser Val Ser Ser Ala Lys Ser Ser Pro Gln Val Ala Leu Asp Glu Pro
    5090            5095            5100
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Ile Ala Ile Ile Gly Ile Gly Cys Arg Phe Pro Gly Gly Val Ala Asp
5105   5110   5115   5120

Pro Glu Ser Phe Trp Arg Leu Leu Glu Glu Gly Ser Asp Ala Val Val
          5125   5130   5135

Glu Val Pro His Glu Arg Trp Asp Ile Asp Ala Phe Tyr Asp Pro Asp
          5140   5145   5150

Pro Asp Val Arg Gly Lys Met Thr Thr Arg Phe Gly Gly Phe Leu Ser
          5155   5160   5165

Asp Ile Asp Arg Phe Asp Pro Ala Phe Phe Gly Ile Ser Pro Arg Glu
     5170   5175   5180

Ala Thr Thr Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Ser Trp
5185   5190   5195   5200

Glu Ala Phe Glu Arg Ala Gly Ile Leu Pro Glu Arg Leu Met Gly Ser
          5205   5210   5215

Asp Thr Gly Val Phe Val Gly Leu Phe Tyr Gln Glu Tyr Ala Ala Leu
          5220   5225   5230

Ala Gly Gly Ile Glu Ala Phe Asp Gly Tyr Leu Gly Thr Gly Thr Thr
          5235   5240   5245

Ala Ser Val Ala Ser Gly Arg Ile Ser Tyr Val Leu Gly Leu Lys Gly
     5250   5255   5260

Pro Ser Leu Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Val
5265   5270   5275   5280

His Leu Ala Cys Gln Ala Leu Arg Arg Gly Glu Cys Ser Val Ala Leu
          5285   5290   5295

Ala Gly Gly Val Ala Leu Met Leu Thr Pro Ala Thr Phe Val Glu Phe
          5300   5305   5310

Ser Arg Leu Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe Ser
     5315   .   5320   5325

Ala Ala Ala Asp Gly Val Gly Trp Ser Glu Gly Cys Ala Met Leu Leu
     5330   5335   5340

Leu Lys Pro Leu Arg Asp Ala Gln Arg Asp Gly Asp Pro Ile Leu Ala
5345   5350   5355   5360

Val Ile Arg Gly Thr Ala Val Asn Gln Asp Gly Arg Ser Asn Gly Leu
          5365   5370   5375

Thr Ala Pro Asn Gly Ser Ser Gln Gln Glu Val Ile Arg Arg Ala Leu
          5380   5385   5390

Glu Gln Ala Gly Leu Ala Pro Ala Asp Val Ser Tyr Val Glu Cys His
     5395   5400   5405

Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu Val Gln Ala Leu Gly
     5410   5415   5420

Ala Val Leu Ala Gln Gly Arg Pro Ser Asp Arg Pro Leu Val Ile Gly
5425   5430   5435   5440

Ser Val Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala
          5445   5450   5455

Gly Val Ile Lys Val Ala Leu Ala Leu Glu Arg Gly Leu Ile Pro Arg
          5460   5465   5470

Ser Leu His Phe Asp Ala Pro Asn Pro His Ile Pro Trp Ser Glu Leu
       5475   5480   5485

Ala Val Gln Val Ala Ala Lys Pro Val Glu Trp Thr Arg Asn Gly Val
    5490   5495   5500

Pro Arg Arg Ala Gly Val Ser Ser Phe Gly Val Ser Gly Thr Asn Ala
5505   5510   5515   5520

His Val Val Leu Glu Glu Ala Pro Ala Ala Ala Phe Ala Pro Ala Ala
             5525   5530   5535

Ala Arg Ser Ala Glu Leu Phe Val Leu Ser Ala Lys Ser Ala Ala Ala
       5540   5545   5550

Leu Asp Ala Gln Ala Ala Arg Leu Ser Ala His Val Val Ala His Pro
       5555   5560   5565

Glu Leu Gly Leu Gly Asp Leu Ala Phe Ser Leu Ala Thr Thr Arg Ser
    5570   5575   5580

Pro Met Thr Tyr Arg Leu Ala Val Ala Ala Thr Ser Arg Glu Ala Leu
5585   5590   5595   5600

Ser Ala Ala Leu Asp Thr Ala Ala Gln Gly Gln Ala Pro Pro Ala Ala
          5605   5610   5615

Ala Arg Gly His Ala Ser Thr Gly Ser Ala Pro Lys Val Val Phe Val
       5620   5625   5630

Phe Pro Gly Gln Gly Ser Gln Trp Leu Gly Met Gly Gln Lys Leu Leu
       5635   5640   5645

Ser Glu Glu Pro Val Phe Arg Asp Ala Leu Ser Ala Cys Asp Arg Ala
    5650   5655   5660

Ile Gln Ala Glu Ala Gly Trp Ser Leu Leu Ala Glu Leu Ala Ala Asp
5665   5670   5675   5680

Glu Thr Thr Ser Gln Leu Gly Arg Ile Asp Val Val Gln Pro Ala Leu
          5685   5690   5695

Phe Ala Ile Glu Val Ala Leu Ser Ala Leu Trp Arg Ser Trp Gly Val
       5700   5705   5710

Glu Pro Asp Ala Val Val Gly His Ser Met Gly Glu Val Ala Ala Ala
       5715   5720   5725

His Val Ala Gly Ala Leu Ser Leu Glu Asp Ala Val Ala Ile Ile Cys
    5730   5735   5740

Arg Arg Ser Leu Leu Leu Arg Arg Ile Ser Gly Gln Gly Glu Met Ala
5745   5750   5755   5760

Val Val Glu Leu Ser Leu Ala Glu Ala Glu Ala Ala Leu Leu Gly Tyr
          5765   5770   5775

Glu Asp Arg Leu Ser Val Ala Val Ser Asn Ser Pro Arg Ser Thr Val
       5780   5785   5790

Leu Ala Gly Glu Pro Ala Ala Leu Ala Glu Val Leu Ala Ile Leu Ala
       5795   5800   5805

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Ala Lys Gly Val Phe Cys Arg Arg Val Lys Val Asp Val Ala Ser His
   5810              5815              5820

Ser Pro Gln Ile Asp Pro Leu Arg Asp Glu Leu Leu Ala Ala Leu Gly
5825              5830              5835              5840

Glu Leu Glu Pro Arg Gln Ala Thr Val Ser Met Arg Ser Thr Val Thr
        5845              5850              5855

Ser Thr Ile Met Ala Gly Pro Glu Leu Val Ala Ser Tyr Trp Ala Asp
        5860              5865              5870

Asn Val Arg Gln Pro Val Arg Phe Ala Glu Ala Val Gln Ser Leu Met
        5875              5880              5885

Glu Asp Gly His Gly Leu Phe Val Glu Met Ser Pro His Pro Ile Leu
   5890              5895              5900

Thr Thr Ser Val Glu Glu Ile Arg Arg Ala Thr Lys Arg Glu Gly Val
5905              5910              5915              5920

Ala Val Gly Ser Leu Arg Arg Gly Gln Asp Glu Arg Leu Ser Met Leu
        5925              5930              5935

Glu Ala Leu Gly Ala Leu Trp Val His Gly Gln Ala Val Gly Trp Glu
        5940              5945              5950

Arg Leu Phe Ser Ala Gly Gly Ala Gly Leu Arg Arg Val Pro Leu Pro
        5955              5960              5965

Thr Tyr Pro Trp Gln Arg Glu Arg Tyr Trp Val Asp Ala Pro Thr Gly
   5970              5975              5980

Gly Ala Ala Gly Gly Ser Arg Phe Ala His Ala Gly Ser His Pro Leu
5985              5990              5995              6000

Leu Gly Glu Met Gln Thr Leu Ser Thr Gln Arg Ser Thr Arg Val Trp
        6005              6010              6015

Glu Thr Thr Leu Asp Leu Lys Arg Leu Pro Trp Leu Gly Asp His Arg
        6020              6025              6030

Val Gln Gly Ala Val Val Phe Pro Gly Ala Ala Tyr Leu Glu Met Ala
        6035              6040              6045

Leu Ser Ser Gly Ala Glu Ala Leu Gly Asp Gly Pro Leu Gln Val Ser
   6050              6055              6060

Asp Val Val Leu Ala Glu Ala Leu Ala Phe Ala Asp Asp Thr Pro Ala
6065              6070              6075              6080

Ala Val Gln Val Met Ala Thr Glu Glu Arg Pro Gly Arg Leu Gln Phe
        6085              6090              6095

His Val Ala Ser Arg Val Pro Gly His Gly Gly Ala Ala Phe Arg Ser
        6100              6105              6110

His Ala Arg Gly Val Leu Arg Gln Ile Glu Arg Ala Glu Val Pro Ala
   6115              6120              6125

Arg Leu Asp Leu Ala Ala Leu Arg Ala Arg Leu Gln Ala Ser Ala Pro
   6130              6135              6140

Ala Ala Ala Thr Tyr Ala Ala Leu Ala Glu Met Gly Leu Glu Tyr Gly
6145              6150              6155              6160
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Pro Ala Phe Gln Gly Leu Val Glu Leu Trp Arg Gly Glu Gly Glu Ala
              6165   6170   6175

Leu Gly Arg Val Arg Leu Pro Glu Ala Ala Gly Ser Pro Ala Ala Cys
         6180   6185   6190

Arg Leu His Pro Ala Leu Leu Asp Ala Cys Phe His Val Ser Ser Ala
         6195   6200   6205

Phe Ala Asp Arg Gly Glu Ala Thr Pro Trp Val Pro Val Glu Ile Gly
         6210   6215   6220

Ser Leu Arg Trp Phe Gln Arg Pro Ser Gly Glu Leu Trp Cys His Ala
6225   6230   6235   6240

Arg Ser Val Ser His Gly Lys Pro Thr Pro Asp Arg Arg Ser Thr Asp
              6245   6250   6255

Phe Trp Val Val Asp Ser Thr Gly Ala Ile Val Ala Glu Ile Ser Gly
              6260   6265   6270

Leu Val Ala Gln Arg Leu Ala Gly Gly Val Arg Arg Arg Glu Glu Asp
         6275   6280   6285

Asp Trp Phe Met Glu Pro Ala Trp Glu Pro Thr Ala Val Pro Gly Ser
    6290   6295   6300

Glu Val Met Ala Gly Arg Trp Leu Leu Ile Gly Ser Gly Gly Gly Leu
6305   6310   6315   6320

Gly Ala Ala Leu His Ser Ala Leu Thr Glu Ala Gly His Ser Val Val
              6325   6330   6335

His Ala Thr Gly Arg Gly Thr Ser Ala Ala Gly Leu Gln Ala Leu Leu
         6340   6345   6350

Thr Ala Ser Phe Asp Gly Gln Ala Pro Thr Ser Val Val His Leu Gly
         6355   6360   6365

Ser Leu Asp Glu Arg Gly Val Leu Asp Ala Asp Ala Pro Phe Asp Ala
    6370   6375   6380

Asp Ala Leu Glu Glu Ser Leu Val Arg Gly Cys Asp Ser Val Leu Trp
6385   6390   6395   6400

Thr Val Gln Ala Val Ala Gly Ala Gly Phe Arg Asp Pro Pro Arg Leu
         6405   6410   6415

Trp Leu Val Thr Arg Gly Ala Gln Ala Ile Gly Ala Gly Asp Val Ser
         6420   6425   6430

Val Ala Gln Ala Pro Leu Leu Gly Leu Gly Arg Val Ile Ala Leu Glu
    6435   6440   6445

His Ala Glu Leu Arg Cys Ala Arg Ile Asp Leu Asp Pro Ala Arg Arg
    6450   6455   6460

Asp Gly Glu Val Asp Glu Leu Leu Ala Glu Leu Leu Ala Asp Asp Ala
6465   6470   6475   6480

Glu Glu Glu Val Ala Phe Arg Gly Gly Glu Arg Arg Val Ala Arg Leu
              6485   6490   6495

Val Arg Arg Leu Pro Glu Thr Asp Cys Arg Glu Lys Ile Glu Pro Ala
         6500   6505   6510

Glu Gly Arg Pro Phe Arg Leu Glu Ile Asp Gly Ser Gly Val Leu Asp
     6515   6520   6525

Asp Leu Val Leu Arg Ala Thr Glu Arg Arg Pro Pro Gly Pro Gly Glu
  6530   6535   6540

Val Glu Ile Ala Val Glu Ala Ala Gly Leu Asn Phe Leu Asp Val Met
6545   6550   6555   6560

Arg Ala Met Gly Ile Tyr Pro Gly Pro Gly Asp Gly Pro Val Ala Leu
       6565   6570   6575

Gly Ala Glu Cys Ser Gly Arg Ile Val Ala Met Gly Glu Gly Val Glu
      6580   6585   6590

Ser Leu Arg Ile Gly Gln Asp Val Val Ala Val Ala Pro Phe Ser Phe
    6595   6600   6605

Gly Thr His Val Thr Ile Asp Ala Arg Met Leu Ala Pro Arg Pro Ala
    6610   6615   6620

Ala Leu Thr Ala Ala Gln Ala Ala Ala Leu Pro Val Ala Phe Met Thr
6625   6630   6635   6640

Ala Trp Tyr Gly Leu Val His Leu Gly Arg Leu Arg Ala Gly Glu Arg
       6645   6650   6655

Val Leu Ile His Ser Ala Thr Gly Gly Thr Gly Leu Ala Ala Val Gln
      6660   6665   6670

Ile Ala Arg His Leu Gly Ala Glu Ile Phe Ala Thr Ala Gly Thr Pro
    6675   6680   6685

Glu Lys Arg Ala Trp Leu Arg Glu Gln Gly Ile Ala His Val Met Asp
  6690   6695   6700

Ser Arg Ser Leu Asp Phe Ala Glu Gln Val Leu Ala Ala Thr Lys Gly
6705   6710   6715   6720

Glu Gly Val Asp Val Val Leu Asn Ser Leu Ser Gly Ala Ala Ile Asp
     6725   6730   6735

Ala Ser Leu Ser Thr Leu Val Pro Asp Gly Arg Phe Ile Glu Leu Gly
      6740   6745   6750

Lys Thr Asp Ile Tyr Ala Asp Arg Ser Leu Gly Leu Ala His Phe Arg
    6755   6760   6765

Lys Ser Leu Ser Tyr Ser Ala Val Asp Leu Ala Gly Leu Ala Val Arg
   6770   6775   6780

Arg Pro Glu Arg Val Ala Ala Leu Leu Ala Glu Val Val Asp Leu Leu
6785   6790   6795   6800

Ala Arg Gly Ala Leu Gln Pro Leu Pro Val Glu Ile Phe Pro Leu Ser
       6805   6810   6815

Arg Ala Ala Asp Ala Phe Arg Lys Met Ala Gln Ala Gln His Leu Gly
      6820   6825   6830

Lys Leu Val Leu Ala Leu Glu Asp Pro Asp Val Arg Ile Arg Val Pro
    6835   6840   6845

Gly Glu Ser Gly Val Ala Ile Arg Ala Asp Gly Ala Tyr Leu Val Thr
    6850   6855   6860

Gly Gly Leu Gly Gly Leu Gly Leu Ser Val Ala Gly Trp Leu Ala Glu
6865   6870   6875   6880

Gln Gly Ala Gly His Leu Val Leu Val Gly Arg Ser Gly Ala Val Ser
          6885   6890   6895

Ala Glu Gln Gln Thr Ala Val Ala Ala Leu Glu Ala His Gly Ala Arg
          6900   6905   6910

Val Thr Val Ala Arg Ala Asp Val Ala Asp Arg Ala Gln Met Glu Arg
          6915   6920   6925

Ile Leu Arg Glu Val Thr Ala Ser Gly Met Pro Leu Arg Gly Val Val
          6930   6935   6940

His Ala Ala Gly Ile Leu Asp Asp Gly Leu Leu Met Gln Gln Thr Pro
6945   6950   6955   6960

Ala Arg Phe Arg Ala Val Met Ala Pro Lys Val Arg Gly Ala Leu His
          6965   6970   6975

Leu His Ala Leu Thr Arg Glu Ala Pro Leu Ser Phe Phe Val Leu Tyr
          6980   6985   6990

Ala Ser Gly Ala Gly Leu Leu Gly Ser Pro Gly Gln Gly Asn Tyr Ala
          6995   7000   7005

Ala Ala Asn Thr Phe Leu Asp Ala Leu Ala His His Arg Arg Ala Gln
          7010   7015   7020

Gly Leu Pro Ala Leu Ser Ile Asp Trp Gly Leu Phe Ala Asp Val Gly
7025   7030   7035   7040

Leu Ala Ala Gly Gln Gln Asn Arg Gly Ala Arg Leu Val Thr Arg Gly
          7045   7050   7055

Thr Arg Ser Leu Thr Pro Asp Glu Gly Leu Trp Ala Leu Glu Arg Leu
          7060   7065   7070

Leu Asp Gly Asp Arg Thr Gln Ala Gly Val Met Pro Phe Asp Val Arg
          7075   7080   7085

Gln Trp Val Glu Phe Tyr Pro Ala Ala Ala Ser Ser Arg Arg Leu Ser
          7090   7095   7100

Arg Leu Met Thr Ala Arg Arg Val Ala Ser Gly Arg Leu Ala Gly Asp
7105   7110   7115   7120

Arg Asp Leu Leu Glu Arg Leu Ala Thr Ala Glu Ala Gly Ala Arg Ala
          7125   7130   7135

Gly Met Leu Gln Glu Val Val Arg Ala Gln Val Ser Gln Val Leu Arg
          7140   7145   7150

Leu Ser Glu Gly Lys Leu Asp Val Asp Ala Pro Leu Thr Ser Leu Gly
          7155   7160   7165

Met Asp Ser Leu Met Gly Leu Glu Leu Arg Asn Arg Ile Glu Ala Val
          7170   7175   7180

Leu Gly Ile Thr Met Pro Ala Thr Leu Leu Trp Thr Tyr Pro Thr Val
7185   7190   7195   7200

Ala Ala Leu Ser Ala His Leu Ala Ser His Val Val Ser Thr Gly Asp
          7205   7210   7215

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Gly Glu Ser Ala Arg Pro Pro Asp Thr Gly Ser Val Ala Pro Thr Thr
        7220              7225            7230

His Glu Val Ala Ser Leu Asp Glu Asp Gly Leu Phe Ala Leu Ile Asp
    7235              7240              7245

Glu Ser Leu Ala Arg Ala Gly Lys Arg
    7250              7255


<210> 6
<211> 3798
<212> PRT
<213> Sorangium cellulosum

<400> 6
Val Thr Asp Arg Glu Gly Gln Leu Leu Glu Arg Leu Arg Glu Val Thr
  1           5                 10                15

Leu Ala Leu Arg Lys Thr Leu Asn Glu Arg Asp Thr Leu Glu Leu Glu
        20                25                30

Lys Thr Glu Pro Ile Ala Ile Val Gly Ile Gly Cys Arg Phe Pro Gly
        35              40                45

Gly Ala Gly Thr Pro Glu Ala Phe Trp Glu Leu Leu Asp Asp Gly Arg
    50              55                60

Asp Ala Ile Arg Pro Leu Glu Glu Arg Trp Ala Leu Val Gly Val Asp
 65              70                75                80

Pro Gly Asp Asp Val Pro Arg Trp Ala Gly Leu Leu Thr Glu Ala Ile
                85              90                95

Asp Gly Phe Asp Ala Ala Phe Phe Gly Ile Ala Pro Arg Glu Ala Arg
            100             105             110

Ser Leu Asp Pro Gln His Arg Leu Leu Leu Glu Val Ala Trp Glu Gly
        115             120             125

Phe Glu Asp Ala Gly Ile Pro Pro Arg Ser Leu Val Gly Ser Arg Thr
    130             135             140

Gly Val Phe Val Gly Val Cys Ala Thr Glu Tyr Leu His Ala Ala Val
145             150             155             160

Ala His Gln Pro Arg Glu Glu Arg Asp Ala Tyr Ser Thr Thr Gly Asn
            165             170             175

Met Leu Ser Ile Ala Ala Gly Arg Leu Ser Tyr Thr Leu Gly Leu Gln
        180             185             190

Gly Pro Cys Leu Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala
        195             200             205

Ile His Leu Ala Cys Arg Ser Leu Arg Ala Arg Glu Ser Asp Leu Ala
    210             215             220

Leu Ala Gly Gly Val Asn Met Leu Leu Ser Pro Asp Thr Met Arg Ala
225             230             235             240

Leu Ala Arg Thr Gln Ala Leu Ser Pro Asn Gly Arg Cys Gln Thr Phe
            245             250             255

Asp Ala Ser Ala Asn Gly Phe Val Arg Gly Glu Gly Cys Gly Leu Ile
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                    260                     265                     270
Val Leu Lys Arg Leu Ser Asp Ala Arg Arg Asp Gly Asp Arg Ile Trp
        275                 280                 285
Ala Leu Ile Arg Gly Ser Ala Ile Asn Gln Asp Gly Arg Ser Thr Gly
        290                 295                 300
Leu Thr Ala Pro Asn Val Leu Ala Gln Gly Ala Leu Leu Arg Glu Ala
305                 310                 315                 320
Leu Arg Asn Ala Gly Val Glu Ala Glu Ala Ile Gly Tyr Ile Glu Thr
                325                 330                 335
His Gly Ala Ala Thr Ser Leu Gly Asp Pro Ile Glu Ile Glu Ala Leu
                340                 345                 350
Arg Ala Val Val Gly Pro Ala Arg Ala Asp Gly Ala Arg Cys Val Leu
        355                 360                 365
Gly Ala Val Lys Thr Asn Leu Gly His Leu Glu Gly Ala Ala Gly Val
        370                 375                 380
Ala Gly Leu Ile Lys Ala Thr Leu Ser Leu His His Glu Arg Ile Pro
385                 390                 395                 400
Arg Asn Leu Asn Phe Arg Thr Leu Asn Pro Arg Ile Arg Ile Glu Gly
                405                 410                 415
Thr Ala Leu Ala Leu Ala Thr Glu Pro Val Pro Trp Pro Arg Thr Gly
                420                 425                 430
Arg Thr Arg Phe Ala Gly Val Ser Ser Phe Gly Met Ser Gly Thr Asn
        435                 440                 445
Ala His Val Val Leu Glu Glu Ala Pro Ala Val Glu Pro Glu Ala Ala
        450                 455                 460
Ala Pro Glu Arg Ala Ala Glu Leu Phe Val Leu Ser Ala Lys Ser Ala
465                 470                 475                 480
Ala Ala Leu Asp Ala Gln Ala Ala Arg Leu Arg Asp His Leu Glu Lys
                485                 490                 495
His Val Glu Leu Gly Leu Gly Asp Val Ala Phe Ser Leu Ala Thr Thr
                500                 505                 510
Arg Ser Ala Met Glu His Arg Leu Ala Val Ala Ala Ser Ser Arg Glu
        515                 520                 525
Ala Leu Arg Gly Ala Leu Ser Ala Ala Ala Gln Gly His Thr Pro Pro
        530                 535                 540
Gly Ala Val Arg Gly Arg Ala Ser Gly Gly Ser Ala Pro Lys Val Val
545                 550                 555                 560
Phe Val Phe Pro Gly Gln Gly Ser Gln Trp Val Gly Met Gly Arg Lys
                565                 570                 575
Leu Met Ala Glu Glu Pro Val Phe Arg Ala Ala Leu Glu Gly Cys Asp
                580                 585                 590
Arg Ala Ile Glu Ala Glu Ala Gly Trp Ser Leu Leu Gly Glu Leu Ser
        595                 600                 605
Ala Asp Glu Ala Ala Ser Gln Leu Gly Arg Ile Asp Val Val Gln Pro
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          610                    615                    620
Val Leu Phe Ala Met Glu Val Ala Leu Ser Ala Leu Trp Arg Ser Trp
625                630                635                640

Gly Val Glu Pro Glu Ala Val Val Gly His Ser Met Gly Glu Val Ala
                645                650                655

Ala Ala His Val Ala Gly Ala Leu Ser Leu Glu Asp Ala Val Ala Ile
            660                665                670

Ile Cys Arg Arg Ser Arg Leu Leu Arg Arg Ile Ser Gly Gln Gly Glu
        675                680                685

Met Ala Leu Val Glu Leu Ser Leu Glu Glu Ala Glu Ala Ala Leu Arg
    690                695                700

Gly His Glu Gly Arg Leu Ser Val Ala Val Ser Asn Ser Pro Arg Ser
705                710                715                720

Thr Val Leu Ala Gly Glu Pro Ala Ala Leu Ser Glu Val Leu Ala Ala
                725                730                735

Leu Thr Ala Lys Gly Val Phe Trp Arg Gln Val Lys Val Asp Val Ala
            740                745                750

Ser His Ser Pro Gln Val Asp Pro Leu Arg Glu Glu Leu Ile Ala Ala
        755                760                765

Leu Gly Ala Ile Arg Pro Arg Ala Ala Ala Val Pro Met Arg Ser Thr
    770                775                780

Val Thr Gly Gly Val Ile Ala Gly Pro Glu Leu Gly Ala Ser Tyr Trp
785                790                795                800

Ala Asp Asn Leu Arg Gln Pro Val Arg Phe Ala Ala Ala Ala Gln Ala
                805                810                815

Leu Leu Glu Gly Gly Pro Ala Leu Phe Ile Glu Met Ser Pro His Pro
            820                825                830

Ile Leu Val Pro Pro Leu Asp Glu Ile Gln Thr Ala Ala Glu Gln Gly
        835                840                845

Gly Ala Ala Val Gly Ser Leu Arg Arg Gly Gln Asp Glu Arg Ala Thr
    850                855                860

Leu Leu Glu Ala Leu Gly Thr Leu Trp Ala Ser Gly Tyr Pro Val Ser
865                870                875                880

Trp Ala Arg Leu Phe Pro Ala Gly Gly Arg Arg Val Pro Leu Pro Thr
                885                890                895

Tyr Pro Trp Gln His Glu Arg Cys Trp Ile Glu Val Glu Pro Asp Ala
            900                905                910

Arg Arg Leu Ala Ala Ala Asp Pro Thr Lys Asp Trp Phe Tyr Arg Thr
    915                920                925

Asp Trp Pro Glu Val Pro Arg Ala Ala Pro Lys Ser Glu Thr Ala His
    930                935                940

Gly Ser Trp Leu Leu Leu Ala Asp Arg Gly Gly Val Gly Glu Ala Val
945                950                955                960

Ala Ala Ala Leu Ser Thr Arg Gly Leu Ser Cys Thr Val Leu His Ala
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              965                 970                 975
Ser Ala Asp Ala Ser Thr Val Ala Glu Gln Val Ser Glu Ala Ala Ser
            980                 985                 990

Arg Arg Asn Asp Trp Gln Gly Val Leu Tyr Leu Trp Gly Leu Asp Ala
        995                1000                1005

Val Val Asp Ala Gly Ala Ser Ala Asp Glu Val Ser Glu Ala Thr Arg
    1010                1015                1020

Arg Ala Thr Ala Pro Val Leu Gly Leu Val Arg Phe Leu Ser Ala Ala
1025                1030                1035                1040

Pro His Pro Pro Arg Phe Trp Val Val Thr Arg Gly Ala Cys Thr Val
                1045                1050                1055

Gly Gly Glu Pro Glu Ala Ser Leu Cys Gln Ala Ala Leu Trp Gly Leu
            1060                1065                1070

Ala Arg Val Ala Ala Leu Glu His Pro Ala Ala Trp Gly Gly Leu Val
        1075                1080                1085

Asp Leu Asp Pro Gln Lys Ser Pro Thr Glu Ile Glu Pro Leu Val Ala
    1090                1095                1100

Glu Leu Leu Ser Pro Asp Ala Glu Asp Gln Leu Ala Phe Arg Ser Gly
1105                1110                1115                1120

Arg Arg His Ala Ala Arg Leu Val Ala Ala Pro Pro Glu Gly Asp Val
            1125                1130                1135

Ala Pro Ile Ser Leu Ser Ala Glu Gly Ser Tyr Leu Val Thr Gly Gly
        1140                1145                1150

Leu Gly Gly Leu Gly Leu Leu Val Ala Arg Trp Leu Val Glu Arg Gly
        1155                1160                1165

Ala Arg His Leu Val Leu Thr Ser Arg His Gly Leu Pro Glu Arg Gln
    1170                1175                1180

Ala Ser Gly Gly Glu Gln Pro Pro Glu Ala Arg Ala Arg Ile Ala Ala
1185                1190                1195                1200

Val Glu Gly Leu Glu Ala Gln Gly Ala Arg Val Thr Val Ala Ala Val
            1205                1210                1215

Asp Val Ala Glu Ala Asp Pro Met Thr Ala Leu Leu Ala Ala Ile Glu
            1220                1225                1230

Pro Pro Leu Arg Gly Val Val His Ala Ala Gly Val Phe Pro Val Arg
        1235                1240                1245

His Leu Ala Glu Thr Asp Glu Ala Leu Leu Glu Ser Val Leu Arg Pro
    1250                1255                1260

Lys Val Ala Gly Ser Trp Leu Leu His Arg Leu Leu Arg Asp Arg Pro
1265                1270                1275                1280

Leu Asp Leu Phe Val Leu Phe Ser Ser Gly Ala Ala Val Trp Gly Gly
            1285                1290                1295

Lys Gly Gln Gly Ala Tyr Ala Ala Ala Asn Ala Phe Leu Asp Gly Leu
        1300                1305                1310

Ala His His Arg Arg Ala His Ser Leu Pro Ala Leu Ser Leu Ala Trp
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         1315              1320              1325
Gly Leu Trp Ala Glu Gly Gly Met Val Asp Ala Lys Ala His Ala Arg
   1330              1335              1340

Leu Ser Asp Ile Gly Val Leu Pro Met Ala Thr Gly Pro Ala Leu Ser
1345              1350              1355              1360

Ala Leu Glu Arg Leu Val Asn Thr Ser Ala Val Gln Arg Ser Val Thr
              1365              1370              1375

Arg Met Asp Trp Ala Arg Phe Ala Pro Val Tyr Ala Ala Arg Gly Arg
         1380              1385              1390

Arg Asn Leu Leu Ser Ala Leu Val Ala Glu Asp Glu Arg Ala Ala Ser
         1395              1400              1405

Pro Pro Val Pro Thr Ala Asn Arg Ile Trp Arg Gly Leu Ser Val Ala
   1410              1415              1420

Glu Ser Arg Ser Ala Leu Tyr Glu Leu Val Arg Gly Ile Val Ala Arg
1425              1430              1435              1440

Val Leu Gly Phe Ser Asp Pro Gly Ala Leu Asp Val Gly Arg Gly Phe
         1445              1450              1455

Ala Glu Gln Gly Leu Asp Ser Leu Met Ala Leu Glu Ile Arg Asn Arg
         1460              1465              1470

Leu Gln Arg Glu Leu Gly Glu Arg Leu Ser Ala Thr Leu Ala Phe Asp
   1475              1480              1485

His Pro Thr Val Glu Arg Leu Val Ala His Leu Leu Thr Asp Val Leu
   1490              1495              1500

Lys Leu Glu Asp Arg Ser Asp Thr Arg His Ile Arg Ser Val Ala Ala
1505              1510              1515              1520

Asp Asp Asp Ile Ala Ile Val Gly Ala Ala Cys Arg Phe Pro Gly Gly
         1525              1530              1535

Asp Glu Gly Leu Glu Thr Tyr Trp Arg His Leu Ala Glu Gly Met Val
         1540              1545              1550

Val Ser Thr Glu Val Pro Ala Asp Arg Trp Arg Ala Ala Asp Trp Tyr
   1555              1560              1565

Asp Pro Asp Pro Glu Val Pro Gly Arg Thr Tyr Val Ala Lys Gly Ala
   1570              1575              1580

Phe Leu Arg Asp Val Arg Ser Leu Asp Ala Ala Phe Phe Ala Ile Ser
1585              1590              1595              1600

Pro Arg Glu Ala Met Ser Leu Asp Pro Gln Gln Arg Leu Leu Leu Glu
         1605              1610              1615

Val Ser Trp Glu Ala Ile Glu Arg Ala Gly Gln Asp Pro Met Ala Leu
         1620              1625              1630

Arg Glu Ser Ala Thr Gly Val Phe Val Gly Met Ile Gly Ser Glu His
   1635              1640              1645

Ala Glu Arg Val Gln Gly Leu Asp Asp Asp Ala Ala Leu Leu Tyr Gly
   1650              1655              1660

Thr Thr Gly Asn Leu Leu Ser Val Ala Ala Gly Arg Leu Ser Phe Phe
```

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    1665                1670                1675                1680
Leu Gly Leu His Gly Pro Thr Met Thr Val Asp Thr Ala Cys Ser Ser
            1685                1690                1695
Ser Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Leu Gly Glu
            1700                1705                1710
Cys Asp Gln Ala Leu Ala Gly Gly Ser Ser Val Leu Leu Ser Pro Arg
        1715                1720                1725
Ser Phe Val Ala Ala Ser Arg Met Arg Leu Leu Ser Pro Asp Gly Arg
        1730                1735                1740
Cys Lys Thr Phe Ser Ala Ala Ala Asp Gly Phe Ala Arg Ala Glu Gly
1745                1750                1755                1760
Cys Ala Val Val Val Leu Lys Arg Leu Arg Asp Ala Gln Arg Asp Arg
                1765                1770                1775
Asp Pro Ile Leu Ala Val Val Arg Ser Thr Ala Ile Asn His Asp Gly
            1780                1785                1790
Pro Ser Ser Gly Leu Thr Val Pro Ser Gly Pro Ala Gln Gln Ala Leu
        1795                1800                1805
Leu Arg Gln Ala Leu Ala Gln Ala Gly Val Ala Pro Ala Glu Val Asp
    1810                1815                1820
Phe Val Glu Cys His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile Glu
1825                1830                1835                1840
Val Gln Ala Leu Gly Ala Val Tyr Gly Arg Gly Arg Pro Ala Glu Arg
                1845                1850                1855
Pro Leu Trp Leu Gly Ala Val Lys Ala Asn Leu Gly His Leu Glu Ala
            1860                1865                1870
Ala Ala Gly Leu Ala Gly Val Leu Lys Val Leu Leu Ala Leu Glu His
        1875                1880                1885
Glu Gln Ile Pro Ala Gln Pro Glu Leu Asp Glu Leu Asn Pro His Ile
    1890                1895                1900
Pro Trp Ala Glu Leu Pro Val Ala Val Val Arg Arg Ala Val Pro Trp
1905                1910                1915                1920
Pro Arg Gly Ala Arg Pro Arg Arg Ala Gly Val Ser Ala Phe Gly Leu
                1925                1930                1935
Ser Gly Thr Asn Ala His Val Val Leu Glu Glu Ala Pro Ala Val Glu
            1940                1945                1950
Pro Val Ala Ala Ala Pro Glu Arg Ala Ala Glu Leu Phe Val Leu Ser
        1955                1960                1965
Ala Lys Ser Ala Ala Ala Leu Asp Ala Gln Ala Ala Arg Leu Arg Asp
        1970                1975                1980
His Leu Glu Lys His Val Glu Leu Gly Leu Gly Asp Val Ala Phe Ser
    1985                1990                1995                2000
Leu Ala Thr Thr Arg Ser Ala Met Glu His Arg Leu Ala Val Ala Ala
            2005                2010                2015
Ser Ser Arg Glu Ala Leu Arg Gly Ala Leu Ser Ala Ala Ala Gln Gly
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                 2020                    2025                    2030
His Thr Pro Pro Gly Ala Val Arg Gly Arg Ala Ser Gly Gly Ser Ala
           2035                2040                2045
Pro Lys Val Val Phe Val Phe Pro Gly Gln Gly Ser Gln Trp Val Gly
      2050                2055                2060
Met Gly Arg Lys Leu Met Ala Glu Glu Pro Val Phe Arg Ala Ala Leu
2065                2070                2075                2080
Glu Gly Cys Asp Arg Ala Ile Glu Ala Glu Ala Gly Trp Ser Leu Leu
                2085                2090                2095
Gly Glu Leu Ser Ala Asp Glu Ala Ala Ser Gln Leu Gly Arg Ile Asp
           2100                2105                2110
Val Val Gln Pro Val Leu Phe Ala Met Glu Val Ala Leu Ser Ala Leu
           2115                2120                2125
Trp Arg Ser Trp Gly Val Glu Pro Glu Ala Val Val Gly His Ser Met
     2130                2135                2140
Gly Glu Val Ala Ala Ala His Val Ala Gly Ala Leu Ser Leu Glu Asp
2145                2150                2155                2160
Ala Val Ala Ile Ile Cys Arg Arg Ser Arg Leu Leu Arg Arg Ile Ser
                2165                2170                2175
Gly Gln Gly Glu Met Ala Leu Val Glu Leu Ser Leu Glu Glu Ala Glu
           2180                2185                2190
Ala Ala Leu Arg Gly His Glu Gly Arg Leu Ser Val Ala Val Ser Asn
           2195                2200                2205
Ser Pro Arg Ser Thr Val Leu Ala Gly Glu Pro Ala Ala Leu Ser Glu
      2210                2215                2220
Val Leu Ala Ala Leu Thr Ala Lys Gly Val Phe Trp Arg Gln Val Lys
2225                2230                2235                2240
Val Asp Val Ala Ser His Ser Pro Gln Val Asp Pro Leu Arg Glu Glu
                2245                2250                2255
Leu Ile Ala Ala Leu Gly Ala Ile Arg Pro Arg Ala Ala Ala Val Pro
           2260                2265                2270
Met Arg Ser Thr Val Thr Gly Gly Val Ile Ala Gly Pro Glu Leu Gly
           2275                2280                2285
Ala Ser Tyr Trp Ala Asp Asn Leu Arg Gln Pro Val Arg Phe Ala Ala
      2290                2295                2300
Ala Ala Gln Ala Leu Leu Glu Gly Gly Pro Ala Leu Phe Ile Glu Met
2305                2310                2315                2320
Ser Pro His Pro Ile Leu Val Pro Pro Leu Asp Glu Ile Gln Thr Ala
           2325                2330                2335
Ala Glu Gln Gly Gly Ala Ala Val Gly Ser Leu Arg Arg Gly Gln Asp
           2340                2345                2350
Glu Arg Ala Thr Leu Leu Glu Ala Leu Gly Thr Leu Trp Ala Ser Gly
      2355                2360                2365
Tyr Pro Val Ser Trp Ala Arg Leu Phe Pro Ala Gly Gly Arg Arg Val
```

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              2370                2375                   2380
Pro Leu Pro Thr Tyr Pro Trp Gln His Glu Arg Tyr Trp Ile Glu Asp
2385                2390                2395                   2400

Ser Val His Gly Ser Lys Pro Ser Leu Arg Leu Arg Gln Leu Arg Asn
               2405                2410                2415

Gly Ala Thr Asp His Pro Leu Leu Gly Ala Pro Leu Leu Val Ser Ala
               2420                2425                2430

Arg Pro Gly Ala His Leu Trp Glu Gln Ala Leu Ser Asp Glu Arg Leu
     2435                2440                2445

Ser Tyr Leu Ser Glu His Arg Val His Gly Glu Ala Val Leu Pro Ser
     2450                2455                2460

Ala Ala Tyr Val Glu Met Ala Leu Ala Ala Gly Val Asp Leu Tyr Gly
2465                2470                2475                   2480

Thr Ala Thr Leu Val Leu Glu Gln Leu Ala Leu Glu Arg Ala Leu Ala
               2485                2490                2495

Val Pro Ser Glu Gly Gly Arg Ile Val Gln Val Ala Leu Ser Glu Glu
               2500                2505                2510

Gly Pro Gly Arg Ala Ser Phe Gln Val Ser Ser Arg Glu Glu Ala Gly
     2515                2520                2525

Arg Ser Trp Val Arg His Ala Thr Gly His Val Cys Ser Gly Gln Ser
     2530                2535                2540

Ser Ala Val Gly Ala Leu Lys Glu Ala Pro Trp Glu Ile Gln Arg Arg
2545                2550                2555                   2560

Cys Pro Ser Val Leu Ser Ser Glu Ala Leu Tyr Pro Leu Leu Asn Glu
               2565                2570                2575

His Ala Leu Asp Tyr Gly Pro Cys Phe Gln Gly Val Glu Gln Val Trp
               2580                2585                2590

Leu Gly Thr Gly Glu Val Leu Gly Arg Val Arg Leu Pro Gly Asp Met
     2595                2600                2605

Ala Ser Ser Ser Gly Ala Tyr Arg Ile His Pro Ala Leu Leu Asp Ala
     2610                2615                2620

Cys Phe Gln Val Leu Thr Ala Leu Leu Thr Thr Pro Glu Ser Ile Glu
2625                2630                2635                   2640

Ile Arg Arg Arg Leu Thr Asp Leu His Glu Pro Asp Leu Pro Arg Ser
               2645                2650                2655

Arg Ala Pro Val Asn Gln Ala Val Ser Asp Thr Trp Leu Trp Asp Ala
               2660                2665                2670

Ala Leu Asp Gly Gly Arg Arg Gln Ser Ala Ser Val Pro Val Asp Leu
     2675                2680                2685

Val Leu Gly Ser Phe His Ala Lys Trp Glu Val Met Glu Arg Leu Ala
     2690                2695                2700

Gln Ala Tyr Ile Ile Gly Thr Leu Arg Ile Trp Asn Val Phe Cys Ala
2705                2710                2715                   2720

Ala Gly Glu Arg His Thr Ile Asp Glu Leu Leu Val Arg Leu Gln Ile
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                    2725                2730                  2735
      Ser Val Val Tyr Arg Lys Val Ile Lys Arg Trp Met Glu His Leu Val
               2740              2745              2750

      Ala Ile Gly Ile Leu Val Gly Asp Gly Glu His Phe Val Ser Ser Gln
               2755              2760              2765

      Pro Leu Pro Glu Pro Asp Leu Ala Ala Val Leu Glu Glu Ala Gly Arg
               2770              2775              2780

      Val Phe Ala Asp Leu Pro Val Leu Phe Glu Trp Cys Lys Phe Ala Gly
      2785              2790              2795              2800

      Glu Arg Leu Ala Asp Val Leu Thr Gly Lys Thr Leu Ala Leu Glu Ile
               2805              2810              2815

      Leu Phe Pro Gly Gly Ser Phe Asp Met Ala Glu Arg Ile Tyr Arg Asp
               2820              2825              2830

      Ser Pro Ile Ala Arg Tyr Ser Asn Gly Ile Val Arg Gly Val Val Glu
               2835              2840              2845

      Ser Ala Ala Arg Val Val Ala Pro Ser Gly Met Phe Ser Ile Leu Glu
               2850              2855              2860

      Ile Gly Ala Gly Thr Gly Ala Thr Thr Ala Ala Val Leu Pro Val Leu
      2865              2870              2875·             2880

      Leu Pro Asp Arg Thr Glu Tyr His Phe Thr Asp Val Ser Pro Leu Phe
               2885              2890              2895

      Leu Ala Arg Ala Glu Gln Arg Phe Arg Asp Tyr Pro Phe Leu Lys Tyr
               2900              2905              2910

      Gly Ile Leu Asp Val Asp Gln Glu Pro Ala Gly Gln Gly Tyr Ala His
               2915              2920              2925

      Gln Arg Phe Asp Val Ile Val Ala Ala Asn Val Ile His Ala Thr Arg
               2930            2935              2940

      Asp Ile Arg Ala Thr Ala Lys Arg Leu Leu Ser Leu Leu Ala Pro Gly
      2945              2950              2955              2960

      Gly Leu Leu Val Leu Val Glu Gly Thr Gly His Pro Ile Trp Phe Asp
               2965              2970              2975        ¶

      Ile Thr Thr Gly Leu Ile Glu Gly Trp Gln Lys Tyr Glu Asp Asp Leu
               2980              2985              2990

      Arg Ile Asp His Pro Leu Leu Pro Ala Arg Thr Trp Cys Asp Val Leu
               2995              3000              3005

      Arg Arg Val Gly Phe Ala Asp Ala Val Ser Leu Pro Gly Asp Gly Ser
         3010            3015              3020

      Pro Ala Gly Ile Leu Gly Gln His Val Ile Leu Ser Arg Ala Pro Gly
      3025              3030              3035              3040

      Ile Ala Gly Ala Ala Cys Asp Ser Ser Gly Glu Ser Ala Thr Glu Ser
                  3045              3050              3055

      Pro Ala Ala Arg Ala Val Arg Gln Glu Trp Ala Asp Gly Ser Ala Asp
               3060              3065              3070

      Val Val His Arg Met Ala Leu Glu Arg Met Tyr Phe His Arg Arg Pro
```

```
            3075              3080              3085
Gly Arg Gln Val Trp Val His Gly Arg Leu Arg Thr Gly Gly Gly Ala
  3090              3095              3100

Phe Thr Lys Ala Leu Ala Gly Asp Leu Leu Leu Phe Glu Asp Thr Gly
3105              3110              3115              3120

Gln Val Val Ala Glu Val Gln Gly Leu Arg Leu Pro Gln Leu Glu Ala
            3125              3130              3135

Ser Ala Phe Ala Pro Arg Asp Pro Arg Glu Glu Trp Leu Tyr Ala Leu
            3140              3145              3150

Glu Trp Gln Arg Lys Asp Pro Ile Pro Glu Ala Pro Ala Ala Ala Ser
            3155              3160              3165

Ser Ser Ser Ala Gly Ala Trp Leu Val Leu Met Asp Gln Gly Gly Thr
            3170              3175              3180

Gly Ala Ala Leu Val Ser Leu Leu Glu Gly Arg Gly Glu Ala Cys Val
3185              3190              3195              3200

Arg Val Ile Ala Gly Thr Ala Tyr Ala Cys Leu Ala Pro Gly Leu Tyr
            3205              3210              3215

Gln Val Asp Pro Ala Gln Pro Asp Gly Phe His Thr Leu Leu Arg Asp
            3220              3225              3230

Ala Phe Gly Glu Asp Arg Ile Cys Arg Ala Val Val His Met Trp Ser
            3235              3240              3245

Leu Asp Ala Thr Ala Ala Gly Glu Arg Ala Thr Ala Glu Ser Leu Gln
            3250              3255              3260

Ala Asp Gln Leu Leu Gly Ser Leu Ser Ala Leu Ser Leu Val Gln Ala
3265              3270              3275              3280

Leu Val Arg Arg Arg Trp Arg Asn Met Pro Arg Leu Trp Leu Leu Thr
            3285              3290              3295

Arg Ala Val His Ala Val Gly Ala Glu Asp Ala Ala Ala Ser Val Ala
            3300              3305              3310

Gln Ala Pro Val Trp Gly Leu Gly Arg Thr Leu Ala Leu Glu His Pro
            3315              3320              3325

Glu Leu Arg Cys Thr Leu Val Asp Val Asn Pro Ala Pro Ser Pro Glu
  3330              3335              3340

Asp Ala Ala Ala Leu Ala Val Glu Leu Gly Ala Ser Asp Arg Glu Asp
3345              3350              3355              3360

Gln Val Ala Leu Arg Ser Asp Gly Arg Tyr Val Ala Arg Leu Val Arg
            3365              3370              3375

Ser Ser Phe Ser Gly Lys Pro Ala Thr Asp Cys Gly Ile Arg Ala Asp
            3380              3385              3390

Gly Ser Tyr Val Ile Thr Asp Gly Met Gly Arg Val Gly Leu Ser Val
            3395              3400              3405

Ala Gln Trp Met Val Met Gln Gly Ala Arg His Val Val Leu Val Asp
  3410              3415              3420

Arg Gly Gly Ala Ser Glu Ala Ser Arg Asp Ala Leu Arg Ser Met Ala
```

```
3425                 3430                3435                3440
Glu Ala Gly Ala Glu Val Gln Ile Val Glu Ala Asp Val Ala Arg Arg
            3445                3450                3455
Asp Asp Val Ala Arg Leu Leu Ser Lys Ile Glu Pro Ser Met Pro Pro
            3460                3465                3470
Leu Arg Gly Ile Val Tyr Val Asp Gly Thr Phe Gln Gly Asp Ser Ser
          3475              3480                3485
Met Leu Glu Leu Asp Ala Arg Arg Phe Lys Glu Trp Met Tyr Pro Lys
         3490              3495              3500
Val Leu Gly Ala Trp Asn Leu His Ala Leu Thr Arg Asp Arg Ser Leu
3505              3510                3515                3520
Asp Phe Phe Val Leu Tyr Ser Ser Gly Thr Ser Leu Leu Gly Leu Pro
            3525              3530              3535
Gly Gln Gly Ser Arg Ala Ala Gly Asp Ala Phe Leu Asp Ala Ile Ala
          3540              3545              3550
His His Arg Cys Lys Val Gly Leu Thr Ala Met Ser Ile Asn Trp Gly
         3555              3560              3565
Leu Leu Ser Glu Ala Ser Ser Pro Ala Thr Pro Asn Asp Gly Gly Ala
3570              3575              3580
Arg Leu Glu Tyr Arg Gly Met Glu Gly Leu Thr Leu Glu Gln Gly Ala
3585              3590              3595              3600
Ala Ala Leu Gly Arg Leu Leu Ala Arg Pro Arg Ala Gln Val Gly Val
            3605              3610              3615
Met Arg Leu Asn Leu Arg Gln Trp Leu Glu Phe Tyr Pro Asn Ala Ala
            3620              3625              3630
Arg Leu Ala Leu Trp Ala Glu Leu Leu Lys Glu Arg Asp Arg Ala Asp
         3635              3640              3645
Arg Gly Ala Ser Asn Ala Ser Asn Leu Arg Glu Ala Leu Gln Ser Ala
         3650              3655              3660
Arg Pro Glu Asp Arg Gln Leu Ile Leu Glu Lys His Leu Ser Glu Leu
3665              3670              3675              3680
Leu Gly Arg Gly Leu Arg Leu Pro Pro Glu Arg Ile Glu Arg His Val
            3685              3690              3695
Pro Phe Ser Asn Leu Gly Met Asp Ser Leu Ile Gly Leu Glu Leu Arg
            3700              3705              3710
Asn Arg Ile Glu Ala Ala Leu Gly Ile Thr Val Pro Ala Thr Leu Leu
         3715              3720              3725
Trp Thr Tyr Pro Asn Val Ala Ala Leu Ser Gly Ser Leu Leu Asp Ile
         3730              3735              3740
Leu Phe Pro Asn Ala Gly Ala Thr His Ala Pro Ala Thr Glu Arg Glu
3745              3750              3755              3760
Lys Ser Phe Glu Asn Asp Ala Ala Asp Leu Glu Ala Leu Arg Gly Met
            3765              3770              3775
Thr Asp Glu Gln Lys Asp Ala Leu Leu Ala Glu Lys Leu Ala Gln Leu
```

<pre>
           3780   3785   3790
Ala Gln Ile Val Gly Glu
        3795
</pre>

<pre>
<210> 7
<211> 2439
<212> PRT
<213> Sorangium cellulosum

<400> 7
Met Ala Thr Thr Asn Ala Gly Lys Leu Glu His Ala Leu Leu Leu Met
  1   5   10   15

Asp Lys Leu Ala Lys Lys Asn Ala Ser Leu Glu Gln Glu Arg Thr Glu
           20   25   30

Pro Ile Ala Ile Val Gly Ile Gly Cys Arg Phe Pro Gly Gly Ala Asp
           35   40   45

Thr Pro Glu Ala Phe Trp Glu Leu Leu Asp Ser Gly Arg Asp Ala Val
        50   55   60

Gln Pro Leu Asp Arg Arg Trp Ala Leu Val Gly Val His Pro Ser Glu
 65   70   75   80

Glu Val Pro Arg Trp Ala Gly Leu Leu Thr Glu Ala Val Asp Gly Phe
                85   90   95

Asp Ala Ala Phe Phe Gly Thr Ser Pro Arg Glu Ala Arg Ser Leu Asp
               100   105   110

Pro Gln Gln Arg Leu Leu Leu Glu Val Thr Trp Glu Gly Leu Glu Asp
           115   120   125

Ala Gly Ile Ala Pro Gln Ser Leu Asp Gly Ser Arg Thr Gly Val Phe
       130   135   140

Leu Gly Ala Cys Ser Ser Asp Tyr Ser His Thr Val Ala Gln Gln Arg
145   150   155   160

Arg Glu Glu Gln Asp Ala Tyr Asp Ile Thr Gly Asn Thr Leu Ser Val
               165   170   175

Ala Ala Gly Arg Leu Ser Tyr Thr Leu Gly Leu Gln Gly Pro Cys Leu
           180   185   190

Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Ile His Leu Ala
           195   200   205

Cys Arg Ser Leu Arg Ala Arg Glu Ser Asp Leu Ala Leu Ala Gly Gly
       210   215   220

Val Asn Met Leu Leu Ser Ser Lys Thr Met Ile Met Leu Gly Arg Ile
225   230   235   240

Gln Ala Leu Ser Pro Asp Gly His Cys Arg Thr Phe Asp Ala Ser Ala
               245   250   255

Asn Gly Phe Val Arg Gly Glu Gly Cys Gly Met Val Val Leu Lys Arg
               260   265   270

Leu Ser Asp Ala Gln Arg His Gly Asp Arg Ile Trp Ala Leu Ile Arg
           275   280   285
</pre>

```
Gly Ser Ala Met Asn Gln Asp Gly Arg Ser Thr Gly Leu Met Ala Pro
    290                 295             300
Asn Val Leu Ala Gln Glu Ala Leu Leu Arg Glu Ala Leu Gln Ser Ala
305             310                 315                 320
Arg Val Asp Ala Gly Ala Ile Gly Tyr Val Glu Thr His Gly Thr Gly
                325             330                 335
Thr Ser Leu Gly Asp Pro Ile Glu Val Glu Ala Leu Arg Ala Val Leu
            340             345                 350
Gly Pro Ala Arg Ala Asp Gly Ser Arg Cys Val Leu Gly Ala Val Lys
        355             360                 365
Thr Asn Leu Gly His Leu Glu Gly Ala Ala Gly Val Ala Gly Leu Ile
    370             375                 380
Lys Ala Ala Leu Ala Leu His His Glu Leu Ile Pro Arg Asn Leu His
385             390                 395                 400
Phe His Thr Leu Asn Pro Arg Ile Arg Ile Glu Gly Thr Ala Leu Ala
                405                 410                 415
Leu Ala Thr Glu Pro Val Pro Trp Pro Arg Ala Gly Arg Pro Arg Phe
            420             425                 430
Ala Gly Val Ser Ala Phe Gly Leu Ser Gly Thr Asn Val His Val Val
        435             440                 445
Leu Glu Glu Ala Pro Ala Thr Val Leu Ala Pro Ala Thr Pro Gly Arg
    450             455                 460
Ser Ala Glu Leu Leu Val Leu Ser Ala Lys Ser Ala Ala Ala Leu Asp
465                 470                 475                 480
Ala Gln Ala Ala Arg Leu Ser Ala His Ile Ala Ala Tyr Pro Glu Gln
            485                 490                 495
Gly Leu Gly Asp Val Ala Phe Ser Leu Val Ser Thr Arg Ser Pro Met
            500             505                 510
Glu His Arg Leu Ala Val Ala Ala Thr Ser Arg Glu Ala Leu Arg Ser
    515                 520                 525
Ala Leu Glu Val Ala Ala Gln Gly Gln Thr Pro Ala Gly Ala Ala Arg
    530             535                 540
Gly Arg Ala Ala Ser Ser Pro Gly Lys Leu Ala Phe Leu Phe Ala Gly
545             550                 555                 560
Gln Gly Ala Gln Val Pro Gly Met Gly Arg Gly Leu Trp Glu Ala Trp
                565             570                 575
Pro Ala Phe Arg Glu Thr Phe Asp Arg Cys Val Thr Leu Phe Asp Arg
            580             585                 590
Glu Leu His Gln Pro Leu Cys Glu Val Met Trp Ala Glu Pro Gly Ser
        595             600                 605
Ser Arg Ser Ser Leu Leu Asp Gln Thr Ala Phe Thr Gln Pro Ala Leu
    610             615                 620
Phe Ala Leu Glu Tyr Ala Leu Ala Ala Leu Phe Arg Ser Trp Gly Val
625             630                 635                 640
```

Glu Pro Glu Leu Val Ala Gly His Ser Leu Gly Glu Leu Val Ala Ala
         645   650   655

Cys Val Ala Gly Val Phe Ser Leu Glu Asp Ala Val Arg Leu Val Val
         660   665   670

Ala Arg Gly Arg Leu Met Gln Ala Leu Pro Ala Gly Gly Ala Met Val
         675   680   685

Ser Ile Ala Ala Pro Glu Ala Asp Val Ala Ala Ala Val Ala Pro His
         690   695   700

Ala Ala Leu Val Ser Ile Ala Ala Val Asn Gly Pro Glu Gln Val Val
705   710   715   720

Ile Ala Gly Ala Glu Lys Phe Val Gln Gln Ile Ala Ala Ala Phe Ala
                   725   730   735

Ala Arg Gly Ala Arg Thr Lys Pro Leu His Val Ser His Ala Phe His
                   740   745   750

Ser Pro Leu Met Asp Pro Met Leu Glu Ala Phe Arg Arg Val Thr Glu
         755   760   765

Ser Val Thr Tyr Arg Arg Pro Ser Ile Ala Leu Val Ser Asn Leu Ser
         770   775   780

Gly Lys Pro Cys Thr Asp Glu Val Ser Ala Pro Gly Tyr Trp Val Arg
785   790   795   800

His Ala Arg Glu Ala Val Arg Phe Ala Asp Gly Val Lys Ala Leu His
                   805   810   815

Ala Ala Gly Ala Gly Leu Phe Val Glu Val Gly Pro Lys Pro Thr Leu
                   820   825   830

Leu Gly Leu Val Pro Ala Cys Leu Pro Asp Ala Arg Pro Val Leu Leu
         835   840   845

Pro Ala Ser Arg Ala Gly Arg Asp Glu Ala Ala Ser Ala Leu Glu Ala
850   855   860

Leu Gly Gly Phe Trp Val Val Gly Gly Ser Val Thr Trp Ser Gly Val
865   870   875   880

Phe Pro Ser Gly Gly Arg Arg Val Pro Leu Pro Thr Tyr Pro Trp Gln
                   885   890   895

Arg Glu Arg Tyr Trp Ile Glu Ala Pro Val Asp Arg Glu Ala Asp Gly
              900   905   910

Thr Gly Arg Ala Arg Ala Gly Gly His Pro Leu Leu Gly Glu Val Phe
              915   920   925

Ser Val Ser Thr His Ala Gly Leu Arg Leu Trp Glu Thr Thr Leu Asp
930   935   940

Arg Lys Arg Leu Pro Trp Leu Gly Glu His Arg Ala Gln Gly Glu Val
945   950   955   960

Val Phe Pro Gly Ala Gly Tyr Leu Glu Met Ala Leu Ser Ser Gly Ala
                   965   970   975

Glu Ile Leu Gly Asp Gly Pro Ile Gln Val Thr Asp Val Val Leu Ile
              980   985   990

```
Glu Thr Leu Thr Phe Ala Gly Asp Thr Ala Val Pro Val Gln Val Val
      995              1000                1005

Thr Thr Glu Glu Arg Pro Gly Arg Leu Arg Phe Gln Val Ala Ser Arg
   1010              1015              1020

Glu Pro Gly Glu Arg Arg Ala Pro Phe Arg Ile His Ala Arg Gly Val
1025              1030              1035              1040

Leu Arg Arg Ile Gly Arg Val Glu Thr Pro Ala Arg Ser Asn Leu Ala
              1045              1050              1055

Ala Leu Arg Ala Arg Leu His Ala Ala Val Pro Ala Ala Ala Ile Tyr
         1060              1065              1070

Gly Ala Leu Ala Glu Met Gly Leu Gln Tyr Gly Pro Ala Leu Arg Gly
      1075              1080              1085

Leu Ala Glu Leu Trp Arg Gly Glu Gly Glu Ala Leu Gly Arg Val Arg
      1090              1095              1100

Leu Pro Glu Ala Ala Gly Ser Ala Thr Ala Tyr Gln Leu His Pro Val
1105              1110              1115              1120

Leu Leu Asp Ala Cys Val Gln Met Ile Val Gly Ala Phe Ala Asp Arg
              1125              1130              1135

Asp Glu Ala Thr Pro Trp Ala Pro Val Glu Val Gly Ser Val Arg Leu
         1140              1145              1150

Phe Gln Arg Ser Pro Gly Glu Leu Trp Cys His Ala Arg Val Val Ser
      1155              1160              1165

Asp Gly Gln Gln Ala Ser Ser Arg Trp Ser Ala Asp Phe Glu Leu Met
   1170              1175              1180

Asp Gly Thr Gly Ala Val Val Ala Glu Ile Ser Arg Leu Val Val Glu
1185              1190              1195              1200

Arg Leu Ala Ser Gly Val Arg Arg Arg Asp Ala Asp Asp Trp Phe Leu
         1205              1210              1215

Glu Leu Asp Trp Glu Pro Ala Ala Leu Gly Gly Pro Lys Ile Thr Ala
      1220              1225              1230

Gly Arg Trp Leu Leu Leu Gly Glu Gly Gly Gly Leu Gly Arg Ser Leu
      1235              1240              1245

Cys Ser Ala Leu Lys Ala Ala Gly His Val Val Val His Ala Ala Gly
   1250              1255              1260

Asp Asp Thr Ser Thr Ala Gly Met Arg Ala Leu Leu Ala Asn Ala Phe
1265              1270              1275              1280

Asp Gly Gln Ala Pro Thr Ala Val Val His Leu Ser Ser Leu Asp Gly
         1285              1290              1295

Gly Gly Gln Leu Gly Pro Gly Leu Gly Ala Gln Gly Ala Leu Asp Ala
      1300              1305              1310

Pro Arg Ser Pro Asp Val Asp Ala Asp Ala Leu Glu Ser Ala Leu Met
   1315              1320              1325

Arg Gly Cys Asp Ser Val Leu Ser Leu Val Gln Ala Leu Val Gly Met
   1330              1335              1340
```

```
Asp Leu Arg Asn Ala Pro Arg Leu Trp Leu Leu Thr Arg Gly Ala Gln
1345            .    1350              1355          1360

Ala Ala Ala Ala Gly Asp Val Ser Val Val Gln Ala Pro Leu Leu Gly
              1365              1370              1375

Leu Gly Arg Thr Ile Ala Leu Glu His Ala Glu Leu Arg Cys Ile Ser
         1380              1385              1390

Val Asp Leu Asp Pro Ala Glu Pro Glu Gly Glu Ala Asp Ala Leu Leu
         1395              1400              1405

Ala Glu Leu Leu Ala Asp Asp Ala Glu Glu Glu Val Ala Leu Arg Gly
    1410              1415              1420

Gly Asp Arg Leu Val Ala Arg Leu Val His Arg Leu Pro Asp Ala Gln
1425              1430              1435              1440

Arg Arg Glu Lys Val Glu Pro Ala Gly Asp Arg Pro Phe Arg Leu Glu
              1445              1450              1455

Ile Asp Glu Pro Gly Ala Leu Asp Gln Leu Val Leu Arg Ala Thr Gly
         1460              1465              1470

Arg Arg Ala Pro Gly Pro Gly Glu Val Glu Ile Ser Val Glu Ala Ala
         1475              1480              1485

Gly Leu Asp Ser Ile Asp Ile Gln Leu Ala Leu Gly Val Ala Pro Asn
    1490              1495              1500

Asp Leu Pro Gly Glu Glu Ile Glu Pro Leu Val Leu Gly Ser Glu Cys
1505              1510              1515              1520

Ala Gly Arg Ile Val Ala Val Gly Glu Gly Val Asn Gly Leu Val Val
         1525              1530              1535

Gly Gln Pro Val Ile Ala Leu Ala Ala Gly Val Phe Ala Thr His Val
         1540              1545              1550

Thr Thr Ser Ala Thr Leu Val Leu Pro Arg Pro Leu Gly Leu Ser Ala
    1555              1560              1565

Thr Glu Ala Ala Ala Met Pro Leu Ala Tyr Leu Thr Ala Trp Tyr Ala
    1570              1575              1580

Leu Asp Lys Val Ala His Leu Gln Ala Gly Glu Arg Val Leu Ile His
1585              1590              1595              1600

Ala Glu Ala Gly Gly Val Gly Leu Cys Ala Val Arg Trp Ala Gln Arg
              1605              1610              1615

Val Gly Ala Glu Val Tyr Ala Thr Ala Asp Thr Pro Glu Asn Arg Ala
         1620              1625              1630

Tyr Leu Glu Ser Leu Gly Val Arg Tyr Val Ser Asp Ser Arg Ser Gly
         1635              1640              1645

Arg Phe Val Thr Asp Val His Ala Trp Thr Asp Gly Glu Gly Val Asp
    1650              1655              1660

Val Val Leu Asp Ser Leu Ser Gly Glu Arg Ile Asp Lys Ser Leu Met
1665              1670              1675              1680

Val Leu Arg Ala Cys Gly Arg Leu Val Lys Leu Gly Arg Arg Asp Asp
              1685              1690              1695
```

Cys Ala Asp Thr Gln Pro Gly Leu Pro Pro Leu Leu Arg Asn Phe Ser
          1700   1705   1710

Phe Ser Gln Val Asp Leu Arg Gly Met Met Leu Asp Gln Pro Ala Arg
          1715   1720   1725

Ile Arg Ala Leu Leu Asp Glu Leu Phe Gly Leu Val Ala Ala Gly Ala
      1730   1735   1740

Ile Ser Pro Leu Gly Ser Gly Leu Arg Val Gly Gly Ser Leu Thr Pro
1745   1750   1755   1760

Pro Pro Val Glu Thr Phe Pro Ile Ser Arg Ala Ala Glu Ala Phe Arg
              1765   1770   1775

Arg Met Ala Gln Gly Gln His Leu Gly Lys Leu Val Leu Thr Leu Asp
              1780   1785   1790

Asp Pro Glu Val Arg Ile Arg Ala Pro Ala Glu Ser Ser Val Ala Val
          1795   1800   1805

Arg Ala Asp Gly Thr Tyr Leu Val Thr Gly Gly Leu Gly Gly Leu Gly
      1810   1815   1820

Leu Arg Val Ala Gly Trp Leu Ala Glu Arg Gly Ala Gly Gln Leu Val
1825   1830   1835   1840

Leu Val Gly Arg Ser Gly Ala Ala Ser Ala Glu Gln Arg Ala Ala Val
              1845   1850   1855

Ala Ala Leu Glu Ala His Gly Ala Arg Val Thr Val Ala Lys Ala Asp
              1860   1865   1870

Val Ala Asp Arg Ser Gln Ile Glu Arg Val Leu Arg Glu Val Thr Ala
          1875   1880   1885

Ser Gly Met Pro Leu Arg Gly Val Val His Ala Ala Gly Leu Val Asp
      1890   1895   1900

Asp Gly Leu Leu Met Gln Gln Thr Pro Ala Arg Phe Arg Thr Val Met
1905   1910   1915   1920

Gly Pro Lys Val Gln Gly Ala Leu His Leu His Thr Leu Thr Arg Glu
          1925   1930   1935

Ala Pro Leu Ser Phe Phe Val Leu Tyr Ala Ser Ala Ala Gly Leu Phe
          1940   1945   1950

Gly Ser Pro Gly Gln Gly Asn Tyr Ala Ala Ala Asn Ala Phe Leu Asp
          1955   1960   1965

Ala Leu Ser His His Arg Arg Ala Gln Gly Leu Pro Ala Leu Ser Ile
      1970   1975   1980

Asp Trp Gly Met Phe Thr Glu Val Gly Met Ala Val Ala Gln Glu Asn
1985   1990   1995   2000

Arg Gly Ala Arg Gln Ile Ser Arg Gly Met Arg Gly Ile Thr Pro Asp
              2005   2010   2015

Glu Gly Leu Ser Ala Leu Ala Arg Leu Leu Glu Gly Asp Arg Val Gln
          2020   2025   2030

Thr Gly Val Ile Pro Ile Thr Pro Arg Gln Trp Val Glu Phe Tyr Pro
      2035   2040   2045

Ala Thr Ala Ala Ser Arg Arg Leu Ser Arg Leu Val Thr Thr Gln Arg
    2050   2055   2060

Ala Val Ala Asp Arg Thr Ala Gly Asp Arg Asp Leu Leu Glu Gln Leu
2065   2070   2075   2080

Ala Ser Ala Glu Pro Ser Ala Arg Ala Gly Leu Leu Gln Asp Val Val
              2085   2090   2095

Arg Val Gln Val Ser His Val Leu Arg Leu Pro Glu Asp Lys Ile Glu
              2100   2105   2110

Val Asp Ala Pro Leu Ser Ser Met Gly Met Asp Ser Leu Met Ser Leu
              2115   2120   2125

Glu Leu Arg Asn Arg Ile Glu Ala Ala Leu Gly Val Ala Ala Pro Ala
    2130   2135   2140

Ala Leu Gly Trp Thr Tyr Pro Thr Val Ala Ala Ile Thr Arg Trp Leu
2145   2150   2155   2160

Leu Asp Asp Ala Leu Val Val Arg Leu Gly Gly Gly Ser Asp Thr Asp
              2165   2170   2175

Glu Ser Thr Ala Ser Ala Gly Ser Phe Val His Val Leu Arg Phe Arg
              2180   2185   2190

Pro Val Val Lys Pro Arg Ala Arg Leu Phe Cys Phe His Gly Ser Gly
    2195   2200   2205

Gly Ser Pro Glu Gly Phe Arg Ser Trp Ser Glu Lys Ser Glu Trp Ser
    2210   2215   2220

Asp Leu Glu Ile Val Ala Met Trp His Asp Arg Ser Leu Ala Ser Glu
2225   2230   2235   2240

Asp Ala Pro Gly Lys Lys Tyr Val Gln Glu Ala Ala Ser Leu Ile Gln
              2245   2250   2255

His Tyr Ala Asp Ala Pro Phe Ala Leu Val Gly Phe Ser Leu Gly Val
              2260   2265   2270

Arg Phe Val Met Gly Thr Ala Val Glu Leu Ala Ser Arg Ser Gly Ala
    2275   2280   2285

Pro Ala Pro Leu Ala Val Phe Thr Leu Gly Gly Ser Leu Ile Ser Ser
    2290   2295   2300

Ser Glu Ile Thr Pro Glu Met Glu Thr Asp Ile Ile Ala Lys Leu Phe
2305   2310   2315   2320

Phe Arg Asn Ala Ala Gly Phe Val Arg Ser Thr Gln Gln Val Gln Ala
              2325   2330   2335

Asp Ala Arg Ala Asp Lys Val Ile Thr Asp Thr Met Val Ala Pro Ala
              2340   2345   2350

Pro Gly Asp Ser Lys Glu Pro Pro Val Lys Ile Ala Val Pro Ile Val
    2355   2360   2365

Ala Ile Ala Gly Ser Asp Asp Val Ile Val Pro Pro Ser Asp Val Gln
    2370   2375   2380

Asp Leu Gln Ser Arg Thr Thr Glu Arg Phe Tyr Met His Leu Leu Pro
2385   2390   2395   2400

```
Gly Asp His Glu Phe Leu Val Asp Arg Gly Arg Glu Ile Met His Ile
        2405                2410                2415

Val Asp Ser His Leu Asn Pro Leu Leu Ala Ala Arg Thr Thr Ser Ser
        2420                2425                2430

Gly Pro Ala Phe Glu Ala Lys
        2435


<210> 8
<211> 419
<212> PRT
<213> Sorangium cellulosum

<400> 8
Met Thr Gln Glu Gln Ala Asn Gln Ser Glu Thr Lys Pro Ala Phe Asp
  1               5                  10                  15

Phe Lys Pro Phe Ala Pro Gly Tyr Ala Glu Asp Pro Phe Pro Ala Ile
        20                  25                  30

Glu Arg Leu Arg Glu Ala Thr Pro Ile Phe Tyr Trp Asp Glu Gly Arg
        35                  40                  45

Ser Trp Val Leu Thr Arg Tyr His Asp Val Ser Ala Val Phe Arg Asp
    50                  55                  60

Glu Arg Phe Ala Val Ser Arg Glu Glu Trp Glu Ser Ser Ala Glu Tyr
65                  70                  75                  80

Ser Ser Ala Ile Pro Glu Leu Ser Asp Met Lys Lys Tyr Gly Leu Phe
                85                  90                  95

Gly Leu Pro Pro Glu Asp His Ala Arg Val Arg Lys Leu Val Asn Pro
            100                 105                 110

Ser Phe Thr Ser Arg Ala Ile Asp Leu Leu Arg Ala Glu Ile Gln Arg
        115                 120                 125

Thr Val Asp Gln Leu Leu Asp Ala Arg Ser Gly Gln Glu Glu Phe Asp
    130                 135                 140

Val Val Arg Asp Tyr Ala Glu Gly Ile Pro Met Arg Ala Ile Ser Ala
145                 150                 155                 160

Leu Leu Lys Val Pro Ala Glu Cys Asp Glu Lys Phe Arg Arg Phe Gly
            165                 170                 175

Ser Ala Thr Ala Arg Ala Leu Gly Val Gly Leu Val Pro Gln Val Asp
            180                 185                 190

Glu Glu Thr Lys Thr Leu Val Ala Ser Val Thr Glu Gly Leu Ala Leu
        195                 200                 205

Leu His Asp Val Leu Asp Glu Arg Arg Arg Asn Pro Leu Glu Asn Asp
    210                 215                 220

Val Leu Thr Met Leu Leu Gln Ala Glu Ala Asp Gly Ser Arg Leu Ser
225                 230                 235                 240

Thr Lys Glu Leu Val Ala Leu Val Gly Ala Ile Ile Ala Ala Gly Thr
                245                 250                 255

Asp Thr Thr Ile Tyr Leu Ile Ala Phe Ala Val Leu Asn Leu Leu Arg
            260                 265                 270
```

```
Ser Pro Glu Ala Leu Glu Leu Val Lys Ala Glu Pro Gly Leu Met Arg
        275             280             285
Asn Ala Leu Asp Glu Val Leu Arg Phe Asp Asn Ile Leu Arg Ile Gly
        290             295             300
Thr Val Arg Phe Ala Arg Gln Asp Leu Glu Tyr Cys Gly Ala Ser Ile
305             310             315             320
Lys Lys Gly Glu Met Val Phe Leu Leu Ile Pro Ser Ala Leu Arg Asp
            325             330             335
Gly Thr Val Phe Ser Arg Pro Asp Val Phe Asp Val Arg Arg Asp Thr
            340             345             350
Gly Ala Ser Leu Ala Tyr Gly Arg Gly Pro His Val Cys Pro Gly Val
        355             360             365
Ser Leu Ala Arg Leu Glu Ala Glu Ile Ala Val Gly Thr Ile Phe Arg
        370             375             380
Arg Phe Pro Glu Met Lys Leu Lys Glu Thr Pro Val Phe Gly Tyr His
385             390             395             400
Pro Ala Phe Arg Asn Ile Glu Ser Leu Asn Val Ile Leu Lys Pro Ser
            405             410             415
Lys Ala Gly
```

<210> 9
<211> 607
<212> PRT
<213> Sorangium cellulosum

<400> 9
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Ala Ser Leu Asp Ala Leu Phe Ala Arg Ala Thr Ser Ala Arg Val Leu
1               5               10              15
Asp Asp Gly His Gly Arg Ala Thr Glu Arg His Val Leu Ala Glu Ala
            20              25              30
Arg Gly Ile Glu Asp Leu Arg Ala Leu Arg Glu His Leu Arg Ile Gln
        35              40              45
Glu Gly Gly Pro Ser Phe His Cys Met Cys Leu Gly Asp Leu Thr Val
    50              55              60
Glu Leu Leu Ala His Asp Gln Pro Leu Ala Ser Ile Ser Phe His His
65              70              75              80
Ala Arg Ser Leu Arg His Pro Asp Trp Thr Ser Asp Ala Met Leu Val
            85              90              95
Asp Gly Pro Ala Leu Val Arg Trp Leu Ala Ala Arg Gly Ala Pro Gly
            100             105             110
Pro Leu Arg Glu Tyr Glu Glu Glu Arg Glu Arg Ala Arg Thr Ala Gln
        115             120             125
Glu Ala Arg Arg Leu Trp Leu Ala Ala Ala Pro Pro Cys Phe Ala Pro
        130             135             140
Asp Leu Pro Arg Phe Glu Asp Asp Ala Asn Gly Leu Pro Leu Gly Pro
```

```
145                    150                    155                    160
Met Ser Pro Glu Val Ala Glu Ala Glu Arg Arg Leu Arg Ala Ser Tyr
            165                    170                    175

Ala Thr Pro Glu Leu Ala Cys Ala Ala Leu Leu Ala Trp Leu Gly Thr
            180                    185                    190

Gly Ala Gly Pro Trp Ser Gly Tyr Pro Ala Tyr Glu Met Leu Pro Glu
            195                    200                    205

Asn Leu Leu Leu Gly Phe Gly Leu Pro Thr Ala Ile Ala Ala Ala Ser
    210                    215                    220

Ala Pro Gly Thr Ser Glu Ala Ala Leu Arg Gly Ala Ala Arg Leu Phe
225                    230                    235                    240

Ala Ser Trp Glu Val Val Ser Ser Lys Lys Ser Gln Leu Gly Asn Ile
            245                    250                    255

Pro Glu Ala Leu Trp Glu Arg Leu Arg Thr Ile Val Arg Ala Met Gly
            260                    265                    270

Asn Ala Asp Asn Leu Ser Arg Phe Glu Arg Ala Glu Ala Ile Ala Ala
            275                    280                    285

Glu Val Arg Arg Leu Arg Ala Gln Pro Ala Pro Phe Ala Ala Gly Ala
    290                    295                    300

Gly Leu Ala Val Ala Gly Val Ser Ser Ser Gly Arg Leu Ser Gly Leu
305                    310                    315                    320

Val Thr Asp Gly Asp Ala Leu Tyr Ser Gly Asp Gly Asn Asp Ile Val
            325                    330                    335

Met Phe Gln Pro Gly Arg Ile Ser Pro Val Val Leu Leu Ala Gly Thr
            340                    345                    350

Asp Pro Phe Phe Glu Leu Ala Pro Pro Leu Ser Gln Met Leu Phe Val
            355                    360                    365

Ala His Ala Asn Ala Gly Thr Ile Ser Lys Val Leu Thr Glu Gly Ser
    370                    375                    380

Pro Leu Ile Val Met Ala Arg Asn Gln Ala Arg Pro Met Ser Leu Val
385                    390                    395                    400

His Ala Arg Gly Phe Met Ala Trp Val Asn Gln Ala Met Val Pro Asp
            405                    410                    415

Pro Glu Arg Gly Ala Pro Phe Val Val Gln Arg Ser Thr Ile Met Glu
            420                    425                    430

Phe Glu His Pro Thr Pro Arg Cys Leu His Glu Pro Ala Gly Ser Ala
            435                    440                    445

Phe Ser Leu Ala Cys Asp Glu Glu His Leu Tyr Trp Cys Glu Leu Ser
    450                    455                    460

Ala Gly Arg Leu Glu Leu Trp Arg His Pro His His Arg Pro Gly Ala
465                    470                    475                    480

Pro Ser Arg Phe Ala Tyr Leu Gly Glu His Pro Ile Ala Ala Thr Trp
            485                    490                    495

Tyr Pro Ser Leu Thr Leu Asn Ala Thr His Val Leu Trp Ala Asp Pro
```

```
            500                   505                   510
Asp Arg Arg Ala Ile Leu Gly Val Asp Lys Arg Thr Gly Val Glu Pro
        515                 520                 525
Ile Val Leu Ala Glu Thr Arg His Pro Pro Ala His Val Val Ser Glu
    530                 535                 540
Asp Arg Asp Ile Phe Ala Leu Thr Gly Gln Pro Asp Ser Arg Asp Trp
545                 550                 555                 560
His Val Glu His Ile Arg Ser Gly Ala Ser Thr Val Val Ala Asp Tyr
                565                 570                 575
Gln Arg Gln Leu Trp Asp Arg Pro Asp Met Val Leu Asn Arg Arg Gly
        580                 585                 590
Leu Phe Phe Thr Thr Asn Asp Arg Ile Leu Thr Leu Ala Arg Ser
        595                 600                 605
```

<210> 10
<211> 423
<212> PRT
<213> Sorangium cellulosum

<400> 10
```
Met Gly Ala Leu Ile Ser Val Ala Ala Pro Gly Cys Ala Leu Gly Gly
  1               5                  10                  15
Ala Glu Glu Glu Gly Gln Pro Gly Gln Asp Ala Gly Ala Gly Ala Leu
                20                  25                  30
Ala Pro Ala Arg Glu Val Met Ala Ala Glu Val Ala Ala Gly Gln Met
        35                  40                  45
Pro Gly Ala Val Trp Leu Val Ala Arg Gly Asp Asp Val His Val Asp
        50                  55                  60
Ala Val Gly Val Thr Glu Leu Gly Gly Ser Ala Pro Met Arg Arg Asp
  65                  70                  75                  80
Thr Ile Phe Arg Ile Ala Ser Met Thr Lys Ala Val Thr Ala Thr Ala
                85                  90                  95
Val Met Met Leu Val Glu Glu Gly Lys Leu Asp Leu Asp Ser Pro Val
            100                 105                 110
Asp Arg Trp Leu Pro Glu Leu Ala Asn Arg Lys Val Leu Ala Arg Ile
        115                 120                 125
Asp Gly Pro Ile Asp Glu Thr Val Pro Ala Glu Arg Pro Ile Thr Val
    130                 135                 140
Arg Asp Leu Met Thr Phe Thr Met Gly Phe Gly Ile Ser Phe Asp Ala
145                 150                 155                 160
Ser Ser Pro Ile Gln Arg Ala Ile Asp Glu Leu Gly Leu Val Asn Ala
            165                 170                 175
Gln Pro Val Pro Met Thr Pro His Gly Pro Asp Glu Trp Ile Arg Arg
        180                 185                 190
Leu Gly Thr Leu Pro Leu Met His Gln Pro Gly Ala Gln Trp Met Tyr
        195                 200                 205
```

```
Asn Thr Gly Ser Leu Val Gln Gly Val Leu Val Gly Arg Ala Ala Asp
    210                 215             220

Gln Gly Phe Asp Ala Phe Val Arg Glu Arg Ile Leu Ala Pro Leu Gly
225                 230             235                 240

Met Arg Asp Thr Asp Phe His Val Pro Ala Asp Lys Leu Ala Arg Phe
            245             250             255

Ala Gly Cys Gly Tyr Phe Thr Asp Glu Gln Thr Gly Glu Lys Thr Arg
        260             265             270

Met Asp Arg Asp Gly Ala Glu Ser Ala Tyr Ala Ser Pro Pro Ala Phe
        275             280             285

Pro Ser Gly Ala Ala Gly Leu Val Ser Thr Val Asp Asp Tyr Leu Leu
    290             295             300

Phe Ala Arg Met Leu Met Asn Gly Gly Val His Glu Gly Arg Arg Leu
305             310             315             320

Leu Ser Ala Ala Ser Val Arg Glu Met Thr Ala Asp His Leu Thr Pro
            325             330             335

Ala Gln Lys Ala Ala Ser Ser Phe Phe Pro Gly Phe Phe Glu Thr His
            340             345             350

Gly Trp Gly Tyr Gly Met Ala Val Val Thr Ala Pro Asp Ala Val Ser
        355             360             365

Glu Val Pro Gly Arg Tyr Gly Trp Asp Gly Gly Phe Gly Thr Ser Trp
    370             375             380

Ile Asn Asp Pro Gly Arg Glu Leu Ile Gly Ile Val Met Thr Gln Ser
385             390             395             400

Ala Gly Phe Leu Phe Ser Gly Ala Leu Glu Arg Phe Trp Arg Ser Val
            405             410             415

Tyr Val Ala Thr Glu Ser Ala
            420
```

```
<210> 11
<211> 713
<212> PRT
<213> Sorangium cellulosum

<400> 11
Met His Gly Leu Thr Glu Arg Gln Val Leu Leu Ser Leu Val Thr Leu
    1               5               10              15

Ala Leu Ile Leu Val Thr Ala Arg Ala Ser Gly Glu Leu Ala Arg Arg
            20              25              30

Leu Arg Gln Pro Glu Val Leu Gly Glu Leu Phe Gly Gly Val Val Leu
        35              40              45

Gly Pro Ser Val Val Gly Ala Leu Ala Pro Gly Phe His Arg Ala Leu
    50              55              60

Phe Gln Glu Pro Ala Val Gly Val Val Leu Ser Gly Ile Ser Trp Ile
65              70              75              80

Gly Ala Leu Leu Leu Leu Leu Met Ala Gly Ile Glu Val Asp Val Gly
            85              90              95
```

```
Ile Leu Arg Lys Glu Ala Arg Pro Gly Ala Leu Ser Ala Leu Gly Ala
            100             105             110

Ile Ala Pro Pro Leu Ala Ala Gly Ala Ala Phe Ser Ala Leu Val Leu
            115             120             125

Asp Arg Pro Leu Pro Ser Gly Leu Phe Leu Gly Ile Val Leu Ser Val
    130             135             140

Thr Ala Val Ser Val Ile Ala Lys Val Leu Ile Glu Arg Glu Ser Met
145             150             155             160

Arg Arg Ser Tyr Ala Gln Val Thr Leu Ala Ala Gly Val Val Ser Glu
            165             170             175

Val Ala Ala Trp Val Leu Val Ala Met Thr Ser Ser Ser Tyr Gly Ala
            180             185             190

Ser Pro Ala Leu Ala Val Ala Arg Ser Ala Leu Leu Ala Ser Gly Phe
            195             200             205

Leu Leu Phe Met Val Leu Val Gly Arg Arg Leu Thr His Leu Ala Met
    210             215             220

Arg Trp Val Ala Asp Ala Thr Arg Val Ser Lys Gly Gln Val Ser Leu
225             230             235             240

Val Leu Val Leu Thr Phe Leu Ala Ala Ala Leu Thr Gln Arg Leu Gly
            245             250             255

Leu His Pro Leu Leu Gly Ala Phe Ala Leu Gly Val Leu Leu Asn Ser
            260             265             270

Ala Pro Arg Thr Asn Arg Pro Leu Leu Asp Gly Val Gln Thr Leu Val
            275             280             285

Ala Gly Leu Phe Ala Pro Val Phe Phe Val Leu Ala Gly Met Arg Val
            290             295             300

Asp Val Ser Gln Leu Arg Thr Pro Ala Ala Trp Gly Thr Val Ala Leu
305                 310             315             320

Leu Leu Ala Thr Ala Thr Ala Ala Lys Val Val Pro Ala Ala Leu Gly
            325             330             335

Ala Arg Leu Gly Gly Leu Arg Gly Ser Glu Ala Ala Leu Val Ala Val
            340             345             350

Gly Leu Asn Met Lys Gly Gly Thr Asp Leu Ile Val Ala Ile Val Gly
            355             360             365

Val Glu Leu Gly Leu Leu Ser Asn Glu Ala Tyr Thr Met Tyr Ala Val
    370             375             380

Val Ala Leu Val Thr Val Thr Ala Ser Pro Ala Leu Leu Ile Trp Leu
385             390             395             400

Glu Lys Arg Ala Pro Pro Thr Gln Glu Glu Ser Ala Arg Leu Glu Arg
            405             410             415

Glu Glu Ala Ala Arg Arg Ala Tyr Ile Pro Gly Val Glu Arg Ile Leu
            420             425             430

Val Pro Ile Val Ala His Ala Leu Pro Gly Phe Ala Thr Asp Ile Val
    435             440             445
```

```
Glu Ser Ile Val Ala Ser Lys Arg Lys Leu Gly Glu Thr Val Asp Ile
    450               455           460

Thr Glu Leu Ser Val Glu Gln Gln Ala Pro Gly Pro Ser Arg Ala Ala
465               470               475               480

Gly Glu Ala Ser Arg Gly Leu Ala Arg Leu Gly Ala Arg Leu Arg Val
                485               490               495

Gly Ile Trp Arg Gln Arg Arg Glu Leu Arg Gly Ser Ile Gln Ala Ile
            500               505               510

Leu Arg Ala Ser Arg Asp His Asp Leu Leu Val Ile Gly Ala Arg Ser
        515               520               525

Pro Ala Arg Ala Arg Gly Met Ser Phe Gly Arg Leu Gln Asp Ala Ile
    530               535               540

Val Gln Arg Ala Glu Ser Asn Val Leu Val Val Gly Asp Pro Pro
545               550               555               560

Ala Ala Glu Arg Ala Ser Ala Arg Arg Ile Leu Val Pro Ile Ile Gly
                565               570               575

Leu Glu Tyr Ser Phe Ala Ala Ala Asp Leu Ala Ala His Val Ala Leu
            580               585               590

Ala Trp Asp Ala Glu Leu Val Leu Leu Ser Ser Ala Gln Thr Asp Pro
        595               600               605

Gly Ala Val Val Trp Arg Asp Arg Glu Pro Ser Arg Val Arg Ala Val
    610               615               620

Ala Arg Ser Val Val Asp Glu Ala Val Phe Arg Gly Arg Arg Leu Gly
625               630               635               640

Val Arg Val Ser Ser Arg Val His Val Gly Ala His Pro Ser Asp Glu
            645               650               655

Ile Thr Arg Glu Leu Ala Arg Ala Pro Tyr Asp Leu Leu Val Leu Gly
            660               665               670

Cys Tyr Asp His Gly Pro Leu Gly Arg Leu Tyr Leu Gly Ser Thr Val
        675               680               685

Glu Ser Val Val Val Arg Ser Arg Val Pro Val Ala Leu Leu Val Ala
    690               695               700

His Gly Gly Thr Arg Glu Gln Val Arg
705               710
```

```
<210> 12
<211> 126
<212> PRT
<213> Sorangium cellulosum
```

```
<400> 12
Met Asp Lys Pro Ile Gly Arg Thr Arg Cys Ala Ile Ala Glu Gly Tyr
1               5               10              15

Ile Pro Gly Gly Ser Asn Gly Pro Glu Pro Gln Met Thr Ser His Glu
        20              25              30

Thr Ala Cys Leu Leu Asn Ala Ser Asp Arg Asp Ala Gln Val Ala Ile
```

```
                35                      40                      45
    Thr Val Tyr Phe Ser Asp Arg Asp Pro Ala Gly Pro Tyr Arg Val Thr
            50                      55                      60

    Val Pro Ala Arg Arg Thr Arg His Val Arg Phe Asn Asp Leu Thr Glu
    65                      70                      75                      80

    Pro Glu Pro Ile Pro Arg Asp Thr Asp Tyr Ala Ser Val Ile Glu Ser
                        85                      90                      95

    Asp Ala Pro Ile Val Val Gln His Thr Arg Leu Asp Ser Arg Gln Ala
                    100                     105                     110

    Glu Asn Ala Leu Leu Ser Thr Ile Ala Tyr Thr Asp Arg Glu
                115                     120                     125
```

<210> 13
<211> 149
<212> PRT
<213> Sorangium cellulosum

<400> 13
```
    Met Lys His Val Asp Thr Gly Arg Arg Phe Gly Arg Arg Ile Gly His
    1               5                       10                      15

    Thr Leu Gly Leu Leu Ala Ser Met Ala Leu Ala Gly Cys Gly Gly Pro
                20                      25                      30

    Ser Glu Lys Thr Val Gln Gly Thr Arg Leu Ala Pro Gly Ala Asp Ala
                35                      40                      45

    Arg Val Thr Ala Asp Val Asp Pro Asp Ala Ala Thr Thr Arg Leu Ala
            50                      55                      60

    Val Asp Val Val His Leu Ser Pro Pro Glu Arg Leu Glu Ala Gly Ser
    65                      70                      75                      80

    Glu Arg Phe Val Val Trp Gln Arg Pro Ser Pro Glu Ser Pro Trp Arg
                        85                      90                      95

    Arg Val Gly Val Leu Asp Tyr Asn Ala Asp Ser Arg Arg Gly Lys Leu
                    100                     105                     110

    Ala Glu Thr Thr Val Pro Tyr Ala Asn Phe Glu Leu Leu Ile Thr Ala
                115                     120                     125

    Glu Lys Gln Ser Ser Pro Gln Ser Pro Ser Ser Ala Ala Val Ile Gly
                130                     135                     140

    Pro Thr Ser Val Gly
    145
```

<210> 14
<211> 184
<212> PRT
<213> Sorangium cellulosum

<400> 14
```
    Val Thr Ser Glu Glu Val Pro Gly Ala Ala Leu Gly Ala Gln Ser Ser
    1               5                       10                      15

    Leu Val Arg Ala Gln His Ala Ala Arg His Val Arg Pro Cys Thr Arg
                20                      25                      30
```

```
Ala Glu Glu Pro Pro Ala Leu Met His Gly Leu Thr Glu Arg Gln Val
        35              40              45

Leu Leu Ser Leu Val Ala Leu Ala Leu Val Leu Leu Thr Ala Arg Ala
    50              55              60

Phe Gly Glu Leu Ala Arg Arg Leu Arg Gln Pro Glu Val Leu Gly Glu
65              70              75              80

Leu Phe Gly Gly Val Val Leu Gly Pro Ser Val Val Gly Ala Leu Ala
            85              90              95

Pro Gly Phe His Arg Val Leu Phe Gln Asp Pro Ala Val Gly Val Val
            100             105             110

Leu Ser Gly Ile Ser Trp Ile Gly Ala Leu Val Leu Leu Leu Met Ala
        115             120             125

Gly Ile Glu Val Asp Val Ser Ile Leu Arg Lys Glu Ala Arg Pro Gly
    130             135             140

Ala Leu Ser Ala Leu Gly Ala Ile Ala Pro Pro Leu Arg Thr Pro Gly
145             150             155             160

Pro Leu Val Gln Arg Met Gln Gly Ala Phe Thr Trp Asp Leu Asp Val
            165             170             175

Ser Pro Arg Arg Ser Ala Gln Ala
            180
```

```
<210> 15
<211> 145
<212> PRT
<213> Sorangium cellulosum

<400> 15
Val Asn Ala Pro Cys Met Arg Cys Thr Ser Gly Pro Gly Val Arg Ser
1               5               10              15

Gly Gly Ala Ile Ala Pro Ser Ala Glu Ser Ala Pro Gly Arg Ala Ser
            20              25              30

Leu Arg Arg Met Leu Thr Ser Thr Ser Ile Pro Ala Met Ser Ser Arg
        35              40              45

Thr Ser Ala Pro Ile Gln Glu Met Pro Glu Ser Thr Thr Pro Thr Ala
    50              55              60

Gly Ser Trp Lys Arg Thr Arg Trp Asn Pro Gly Ala Ser Ala Pro Thr
65              70              75              80

Thr Asp Gly Pro Ser Thr Pro Pro Lys Ser Ser Pro Ser Thr Ser
            85              90              95

Gly Trp Arg Ser Arg Arg Ala Ser Ser Pro Lys Ala Arg Ala Val Arg
            100             105             110

Arg Thr Ser Ala Arg Ala Thr Ser Glu Ser Arg Thr Cys Arg Ser Val
        115             120             125

Arg Pro Cys Ile Arg Ala Gly Gly Ser Ser Ala Arg Val Gln Gly Arg
    130             135             140

Thr
```

145

<210> 16
<211> 185
<212> PRT
<213> Sorangium cellulosum

<400> 16
```
Val Leu Ala Pro Pro Ala Asp Ile Arg Pro Pro Ala Ala Ala Gln Leu
 1               5                   10                  15

Glu Pro Asp Ser Pro Asp Asp Glu Ala Asp Glu Ala Asp Glu Ala Leu
            20                  25                  30

Arg Pro Phe Arg Asp Ala Ile Ala Ala Tyr Ser Glu Ala Val Arg Trp
        35                  40                  45

Ala Glu Ala Ala Gln Arg Pro Arg Leu Glu Ser Leu Val Arg Leu Ala
    50                  55                  60

Ile Val Arg Leu Gly Lys Ala Leu Asp Lys Val Pro Phe Ala His Thr
65                  70                  75                  80

Thr Ala Gly Val Ser Gln Ile Ala Gly Arg Leu Gln Asn Asp Ala Val
                85                  90                  95

Trp Phe Asp Val Ala Ala Arg Tyr Ala Ser Phe Arg Ala Ala Thr Glu
            100                 105                 110

His Ala Leu Arg Asp Ala Ala Ser Ala Met Glu Ala Leu Ala Ala Gly
        115                 120                 125

Pro Tyr Arg Gly Ser Ser Arg Val Ser Ala Ala Val Gly Glu Phe Arg
    130                 135                 140

Gly Glu Ala Ala Arg Leu His Pro Ala Asp Arg Val Pro Ala Ser Asp
145                 150                 155                 160

Gln Gln Ile Leu Thr Ala Leu Arg Ala Ala Glu Arg Ala Leu Ile Ala
                165                 170                 175

Leu Tyr Thr Ala Phe Ala Arg Glu Glu
            180                 185
```

<210> 17
<211> 146
<212> PRT
<213> Sorangium cellulosum

<400> 17
```
Met Ala Asp Ala Ala Ser Arg Ser Ala Cys Ser Val Ala Ala Arg Lys
 1               5                   10                  15

Leu Ala Tyr Arg Ala Ala Thr Ser Asn Gln Thr Ala Ser Phe Trp Ser
            20                  25                  30

Leu Pro Ala Ile Trp Glu Thr Pro Ala Val Val Cys Ala Lys Gly Thr
        35                  40                  45

Leu Ser Ser Ala Leu Pro Ser Arg Thr Ile Ala Ser Arg Thr Arg Leu
    50                  55                  60

Ser Ser Arg Gly Arg Cys Ala Ala Ser Ala His Arg Thr Ala Ser Glu
65                  70                  75                  80
```

```
Tyr Ala Ala Ile Ala Ser Arg Asn Gly Arg Ser Ala Ser Ser Ala Ser
                85              90              95

Ser Ala Ser Ser Ser Gly Glu Ser Gly Ser Ser Trp Ala Ala Ala Gly
            100             105             110

Gly Arg Met Ser Ala Gly Gly Ala Ser Thr Gly Glu Val Tyr Glu Gln
            115             120             125

Ala Pro Arg Leu Arg Leu Ala Gln Ser Val Ala Ala Arg Arg Arg Asp
    130             135             140

Pro Thr
145


<210> 18
<211> 288
<212> PRT
<213> Sorangium cellulosum

<400> 18
Val Thr Val Ser Ser Met Pro Arg Ser Trp Ser Ser Arg Val Arg Thr
  1           5               10              15

Val Val Thr Ala Leu Gly Cys Ala Arg Arg Leu Ser Gly Ser Ile Ser
            20              25              30

Arg Leu Arg Arg His Pro Glu Ala Gly Arg Ala Pro Arg Ser Arg Leu
        35              40              45

Arg Ala Trp Arg Arg Leu Pro Gln His Ile Ser Ser Pro Trp Arg His
    50              55              60

Leu Pro Pro Gly Ala Arg Val Gly Thr Ser Cys Pro Ala Asp Arg Arg
65              70              75                  80

Ile Leu Pro Ser His Arg Thr Ala Asp Leu Gly Thr Ser Gly Gly Thr
                85              90              95

Leu Val Ala Arg Met Ser Gly His Val Ala Arg Asn Pro His Ala Ala
            100             105             110

Val Leu Val Gly Asp Gly Ser Ala Arg Gly Arg Arg Arg Leu Ser Asn
            115             120             125

Arg Arg Ala Glu Arg Arg Val Ser Asp Val Thr Cys Arg Glu Gly Gly
    130             135             140

Glu Ala Met Gln Lys Ile Ala Gly Lys Leu Val Val Gly Leu Ile Ser
145             150             155             160

Val Ser Gly Met Ser Leu Leu Ala Ala Cys Gly Gly Glu Lys Arg Ser
                165             170             175

Gly Gly Glu Ala Gln Thr Pro Gly Gly Ala Gln Gly Glu Ala Pro Val
            180             185             190

Pro Val Gly Ser Ala Val Asp Ser Ile Val Ala Ala Arg Cys Asp Arg
            195             200             205

Glu Ala Arg Cys Asn Asn Ile Gly Gln Asp Arg Glu Tyr Ser Ser Lys
    210             215             220

Asp Ala Cys Ser Asn Lys Ile Arg Ser Glu Trp Arg Asp Glu Leu Thr
```

```
225                     230                    235                       240

Phe Gly Glu Cys Pro Gly Gly Ile Asp Ala Lys Gln Leu Asn Glu Cys
                245                    250                    255

Leu Glu Gly Ile Arg Asn Glu Gly Cys Gly Asn Pro Phe Asp Thr Leu
                260                    265                    270

Gly Arg Val Val Ala Cys Arg Ser Ser Asp Leu Cys Arg Asp Ala Arg
            275                    280                    285
```

<210> 19
<211> 288
<212> PRT
<213> Sorangium cellulosum

<400> 19

```
Val Thr Val Ser Ser Met Pro Arg Ser Trp Ser Ser Arg Val Arg Thr
  1               5                  10                    15

Val Val Thr Ala Leu Gly Cys Ala Arg Arg Leu Ser Gly Ser Ile Ser
                20                  25                  30

Arg Leu Arg Arg His Pro Glu Ala Gly Arg Ala Pro Arg Ser Arg Leu
            35                  40                  45

Arg Ala Trp Arg Arg Leu Pro Gln His Ile Ser Ser Pro Trp Arg His
        50                  55                  60

Leu Pro Pro Gly Ala Arg Val Gly Thr Ser Cys Pro Ala Asp Arg Arg
65                  70                  75                  80

Ile Leu Pro Ser His Arg Thr Ala Asp Leu Gly Thr Ser Gly Gly Thr
                85                  90                  95

Leu Val Ala Arg Met Ser Gly His Val Ala Arg Asn Pro His Ala Ala
            100                 105                 110

Val Leu Val Gly Asp Gly Ser Ala Arg Gly Arg Arg Arg Leu Ser Asn
        115                 120                 125

Arg Arg Ala Glu Arg Arg Val Ser Asp Val Thr Cys Arg Glu Gly Gly
    130                 135                 140

Glu Ala Met Gln Lys Ile Ala Gly Lys Leu Val Val Gly Leu Ile Ser
145                 150                 155                 160

Val Ser Gly Met Ser Leu Leu Ala Ala Cys Gly Gly Glu Lys Arg Ser
                165                 170                 175

Gly Gly Glu Ala Gln Thr Pro Gly Gly Ala Gln Gly Glu Ala Pro Val
            180                 185                 190

Pro Val Gly Ser Ala Val Asp Ser Ile Val Ala Ala Arg Cys Asp Arg
            195                 200                 205

Glu Ala Arg Cys Asn Asn Ile Gly Gln Asp Arg Glu Tyr Ser Ser Lys
        210                 215                 220

Asp Ala Cys Ser Asn Lys Ile Arg Ser Glu Trp Arg Asp Glu Leu Thr
225                 230                 235                 240
```

```
Phe Gly Glu Cys Pro Gly Gly Ile Asp Ala Lys Gln Leu Asn Glu Cys
              245                 250                 255

Leu Glu Gly Ile Arg Asn Glu Gly Cys Gly Asn Pro Phe Asp Thr Leu
              260                 265                 270

Gly Arg Val Val Ala Cys Arg Ser Ser Asp Leu Cys Arg Asp Ala Arg
              275                 280                 285
```

<210> 20
<211> 155
<212> PRT
<213> Sorangium cellulosum

<400> 20
```
Met Asp Pro Arg Ala Arg Arg Glu Lys Arg Pro Ser Leu Leu Asp Ser
  1               5                  10                  15

Arg Gly Arg Gln Pro Lys Arg Ser Gln Gln Gly Gly His Met Glu Lys
              20                  25                  30

Pro Ile Gly Arg Thr Arg Trp Ala Ile Ala Glu Gly Tyr Ile Pro Gly
              35                  40                  45

Arg Ser Asn Gly Pro Glu Pro Gln Met Thr Ser His Glu Thr Ala Cys
         50                  55                  60

Leu Leu Asn Ala Ser Asp Arg Asp Ala Gln Val Ala Ile Thr Val Tyr
 65                  70                  75                  80

Phe Ser Asp Arg Asp Pro Ala Gly Pro Tyr Arg Val Thr Val Pro Ala
              85                  90                  95

Arg Arg Thr Arg His Val Arg Phe Asn Asp Leu Thr Glu Pro Glu Pro
             100                 105                 110

Ile Pro Arg Asp Thr Asp Tyr Ala Ser Val Ile Glu Ser Asp Val Pro
         115                 120                 125

Ile Val Val Gln His Thr Arg Leu Asp Ser Arg Gln Ala Glu Asn Ala
         130                 135                 140

Leu Ile Ser Thr Ile Ala Tyr Thr Asp Arg Glu
145                 150                 155
```

<210> 21
<211> 156
<212> PRT
<213> Sorangium cellulosum

<400> 21
```
Val Arg Arg Ser Arg Trp Gln Met Lys His Val Asp Thr Gly Arg Arg
  1               5                  10                  15

Val Gly Arg Arg Ile Gly Leu Thr Leu Gly Leu Leu Ala Ser Met Ala
              20                  25                  30

Leu Ala Gly Cys Gly Gly Pro Ser Glu Lys Ile Val Gln Gly Thr Arg
         35                  40                  45

Leu Ala Pro Gly Ala Asp Ala His Val Ala Ala Asp Val Asp Pro Asp
```

```
                50                      55                      60
Ala Ala Thr Thr Arg Leu Ala Val Asp Val Val His Leu Ser Pro Pro
65                  70                  75                  80

Glu Arg Ile Glu Ala Gly Ser Glu Arg Phe Val Val Trp Gln Arg Pro
                85                  90                  95

Ser Ser Glu Ser Pro Trp Gln Arg Val Gly Val Leu Asp Tyr Asn Ala
                100                 105                 110

Ala Ser Arg Arg Gly Lys Leu Ala Glu Thr Thr Val Pro His Ala Asn
            115                 120                 125

Phe Glu Leu Leu Ile Thr Val Glu Lys Gln Ser Ser Pro Gln Ser Pro
        130                 135                 140

Ser Ser Ala Ala Val Ile Gly Pro Thr Ser Val Gly
145                 150                 155
```

<210> 22
<211> 305
<212> PRT
<213> Sorangium cellulosum

<400> 22
```
Met Glu Lys Glu Ser Arg Ile Ala Ile Tyr Gly Ala Ile Ala Ala Asn
1               5                   10                  15

Val Ala Ile Ala Ala Val Lys Phe Ile Ala Ala Ala Val Thr Gly Ser
            20                  25                  30

Ser Ala Met Leu Ser Glu Gly Val His Ser Leu Val Asp Thr Ala Asp
        35                  40                  45

Gly Leu Leu Leu Leu Gly Lys His Arg Ser Ala Arg Pro Pro Asp
    50                  55                  60

Ala Glu His Pro Phe Gly His Gly Lys Glu Leu Tyr Phe Trp Thr Leu
65                  70                  75                  80

Ile Val Ala Ile Met Ile Phe Ala Ala Gly Gly Gly Val Ser Ile Tyr
                85                  90                  95

Glu Gly Ile Leu His Leu Leu His Pro Arg Gln Ile Glu Asp Pro Thr
            100                 105                 110

Trp Asn Tyr Val Val Leu Gly Ala Ala Ala Val Phe Glu Gly Thr Ser
        115                 120                 125

Leu Ile Ile Ser Ile His Glu Phe Lys Lys Lys Asp Gly Gln Gly Tyr
    130                 135                 140

Leu Ala Ala Met Arg Ser Ser Lys Asp Pro Thr Thr Phe Thr Ile Val
145                 150                 155                 160

Leu Glu Asp Ser Ala Ala Leu Ala Gly Leu Thr Ile Ala Phe Leu Gly
                165                 170                 175

Val Trp Leu Gly His Arg Leu Gly Asn Pro Tyr Leu Asp Gly Ala Ala
            180                 185                 190

Ser Ile Gly Ile Gly Leu Val Leu Ala Ala Val Ala Val Phe Leu Ala
    195                 200                 205
```

```
Ser Gln Ser Arg Gly Leu Leu Val Gly Glu Ser Ala Asp Arg Glu Leu
    210               215               220
Leu Ala Ala Ile Arg Ala Leu Ala Ser Ala Asp Pro Gly Val Ser Ala
225               230               235               240
Val Gly Arg Pro Leu Thr Met His Phe Gly Pro His Glu Val Leu Val
            245               250               255
Val Leu Arg Ile Glu Phe Asp Ala Ala Leu Thr Ala Ser Gly Val Ala
            260               265               270
Glu Ala Ile Glu Arg Ile Glu Thr Arg Ile Arg Ser Glu Arg Pro Asp
        275               280               285
Val Lys His Ile Tyr Val Glu Ala Arg Ser Leu His Gln Arg Ala Arg
    290               295               300
Ala
305
```

```
<210> 23
<211> 135
<212> PRT
<213> Sorangium cellulosum

<400> 23
Val Gln Thr Ser Ser Phe Asp Ala Arg Tyr Ala Gly Cys Lys Ser Ser
    1           5               10              15
Arg Arg Ile Ala Arg Ser Gly Ser Ala Gly Ala Arg Ala Gly Arg Ala
            20              25              30
His Glu Gly Ala Ala Ser Ala Gly Phe Glu Gly Gly Asp Val Met Arg
        35              40              45
Lys Ala Arg Ala His Gly Ala Met Leu Gly Gly Arg Asp Asp Gly Trp
    50              55              60
Arg Arg Gly Leu Pro Gly Ala Gly Ala Leu Arg Ala Ala Leu Gln Arg
65              70              75              80
Gly Arg Ser Arg Asp Leu Ala Arg Arg Arg Leu Ile Ala Ser Val Ser
            85              90              95
Leu Ala Gly Gly Ala Ser Met Ala Val Val Ser Leu Phe Gln Leu Gly
            100             105             110
Ile Ile Glu Arg Leu Pro Asp Pro Pro Leu Pro Gly Phe Asp Ser Ala
        115             120             125
Lys Val Thr Ser Ser Asp Ile
    130             135
```

```
<210> 24
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: universal
      reverse primer

<400> 24
```

```
ggaaacagct atgaccatg                                              19

<210> 25
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: universal
      forward primer

<400> 25
gtaaaacgac ggccagt                                                17

<210> 26
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer
      NH24 end "B"

<400> 26
gtgactggcg cctggaatct gcatgagc                                    28

<210> 27
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer NH2
      end "A"

<400> 27
agcgggagct tgctagacat tctgtttc                                    28

<210> 28
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer NH2
      end "B"

<400> 28
gacgcgcctc gggcagcgcc ccaa                                        24

<210> 29
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer
      pEPO15-NH6 end "B"

<400> 29
caccgaagcg tcgatctggt ccatc                                       25

<210> 30
<211> 25
<212> DNA
<213> Artificial Sequence
```

<220>
<223> Description of Artificial Sequence: PCR primer
      pEPO15H2.7 end "A"

<400> 30
cggtcagatc gacgacgggc tttcc   25